Chapter 2
AFFECTED ENVIRONMENT

Affected Environment—The environmental impact statement shall succinctly describe the area(s) to be affected or created by the alternatives under consideration. (40 CFR 1502.15).

The geographic scope of the environment potentially affected by the ECP encompasses all agricultural lands of the United States and its territories. Any of these lands could be impaired by a natural disaster, with attendant impacts to the terrestrial and aquatic ecosystems and human resources associated with these agricultural lands.

This chapter describes the soil and water resources of agricultural lands, their watershed ecosystems, including aquatic habitats, floodplains, wetlands, riparian areas, and their terrestrial ecosystems. The focus of the discussion is on the characteristics that indicate their general condition or health. The chapter then describes the characteristics of affected human communities, focusing on the rural communities most likely to be affected by disasters and ECP activities.

2.1 LANDS ELIGIBLE FOR ECP

Agricultural lands eligible for ECP are defined by FSA as those lands:

- Normally used for farming or ranching operations;
- Privately owned and on which commercial aquaculture facilities are located;
- Protected by levees or dikes that were effectively functioning before the disaster regardless of type;
- Protected by permanent or temporary vegetative cover (not funded by other conservation programs);
- Used for commercially producing orchards, citrus groves, and vineyards;
- Used for producing agricultural commodities;
- Where conservation structures are installed, including waterways, terraces, sediment basins, diversions, windbreaks, and so forth (not funded by other conservation programs);
- Devoted to container-grown nursery stock if the: nursery grows stock commercially for wholesale purposes;
- Nursery stock is grown on land in containers for at least 1 year;
- On which facilities are located in irrigation canals or facilities that are located on the inside of the canal's banks as long as the canal is not a channel subject to flooding;
- Other lands under productive agricultural use, as deemed by the FSA Deputy Administrator.

Productive agricultural use means production of crops for food or fiber in a commercial operation that occurs on an annual basis under normal conditions, as determined by the Deputy Administrator for farm programs. Land that does not meet the definition of productive agricultural use may be eligible for debris removal if the debris is interfering with normal farming operations, such as field roads and land surrounding farmsteads.

2.1.1 Agricultural Lands of the U.S.

Agricultural land constitutes over 40 percent of the total land area of the U.S. For the purposes of this discussion agricultural lands are considered those lands that raise commodity crops, provide pasture and rangelands for livestock production, support aquaculture, nursery stock that has been established for more than one year, and orchards or vineyards. Appendix J provides data on the amount of acreage devoted to each agricultural category for each state.

2.1.1.1 Farming Regions of the U.S.

Agricultural lands eligible for ECP vary in what they produce due to differences in soils, topography, and climate among the different farming regions across the United States. Figures 2.1-2, 2.1-3, and 2.1-4 show the national distribution of these agricultural lands. (For detailed information on agricultural production specific to each state, refer to Appendix J.)

<u>The Northeast and Lake States</u>

The Northeastern (CT, DE, MA, MD, ME, NH, NJ, NY, PA, RH, and VT) and Lake States (MI, MN, and WI) are the Nation's principal milk-producing areas. Climate and soil in these regions are suited to raising grains and forage for cattle and providing pastureland for grazing (USDA, 1998). Broiler farming is important in Maine, Delaware, and Maryland. Fruits and vegetables are also important to the region (USDA, 1998).

Due to the sometimes-rapid snowmelt, and ice jams, springtime flooding often times has significant negative impacts on this region's agriculture. Flooding can cause severe erosion, deposit debris on farm fields, destroy farm structures, contaminate local water supplies, and negatively affect the quality of the soil.

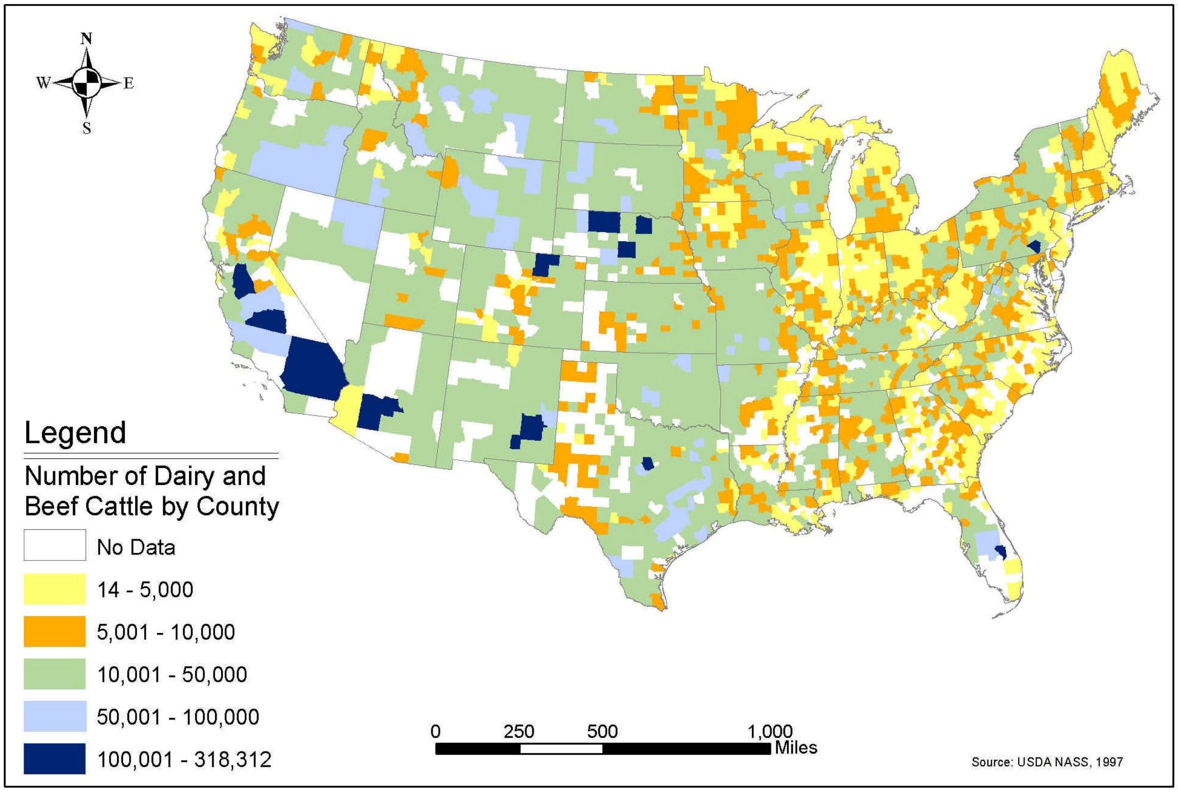


Figure 2.1-1. Number of Dairy and Beef Cattle by County

<u>The Southeast</u>

The Southeastern states (FL, GA, KY, NC, SC, TN, VA, and WV) are the major tobacco-producing area in the Nation. Peanuts, cattle, hog, and dairy production are also important there (USDA, 1998). In the Southeast region, beef and broilers are important livestock products (Figure 2.1-1&2). Fruits, vegetables, and peanuts are grown in this region. Big citrus groves, winter vegetable, and sugarcane production areas in Florida are major suppliers of agricultural goods. Cotton production is making a comeback (USDA, 1998). In recent history, the Southeast has been hit by several major hurricanes. Hurricanes are characterized by having very high-sustained winds with copious amounts of rains. Hurricanes can cause wind damage to crops, flooding, destroy farm buildings and structures, and tidal surges that can contaminate soils with salt water.

<u>South Central</u>

In the South Central states (AL, LA, MS, OK, and TX), the principal cash crops are soybeans and cotton. Rice, corn, and sugarcane are also grown. With improved pastures, livestock production has gained in importance. This region also has the largest number of aquaculture operations in the country (USDA, 1998). Catfish production is concentrated in Mississippi, Alabama, Arkansas, and Louisiana. Catfish are grown in open freshwater ponds, with the total area encompassing between 175,000 and 180,000 acres of the over 600,000 aquaculture acres nationwide (Figure 2.1-2).

Because aquaculture is so heavily dependent on reliable natural resources like water, the potential for a natural disaster causing major damages to aquaculture is high. Droughts can have devastating affects on aquaculture. For example, with reduction of water, fishponds may become susceptible to overcrowding, water temperature may increase, and dissolved oxygen in the water may decreases, all of which negatively affect the biological functions of the aquatic species being raised. Flooding can also have negative affects. Flooding can destroy water control structures such as dikes, dams, and levees; cause the loss of aquaculture from their confinement areas; introduce predators, and possibly introduce disease.

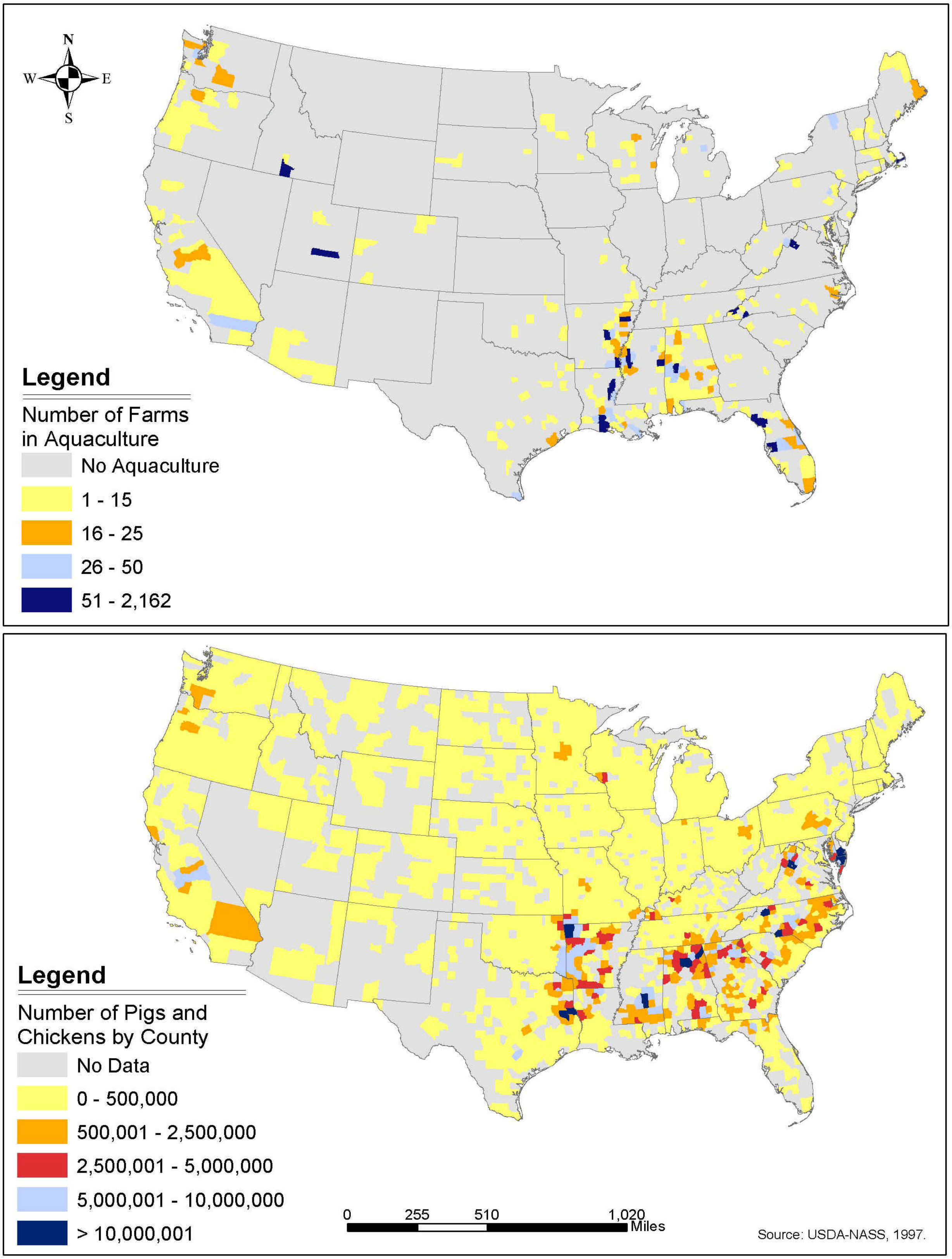


Figure 2.1-2. Number of Farms in Aquaculture, and Number of Pigs and Chickens by County

The Midwest

The Midwest's (IA, IL, IN, MO, and OH) rich soil and good climate support corn, soybeans, cattle, hogs, and dairy production (Figures 2.1-1&3). Other feed grains and wheat are also important (USDA, 1998).

The culmination of the climate, topography, and hydrology of the Midwest, which makes the rich diversity of agricultural products grown there possible, also makes it prone to tornados and floods. Tornados are one of the most powerful forces in nature and due to the vast acreage of land in the Midwest devoted to agriculture, agricultural lands and farm buildings are often times severely impacted by tornados.

Flooding, especially springtime flooding due to rapid snowmelt, affects many agriculture areas of the Midwest. Areas along the Mississippi and other major rivers are especially susceptible to flooding.

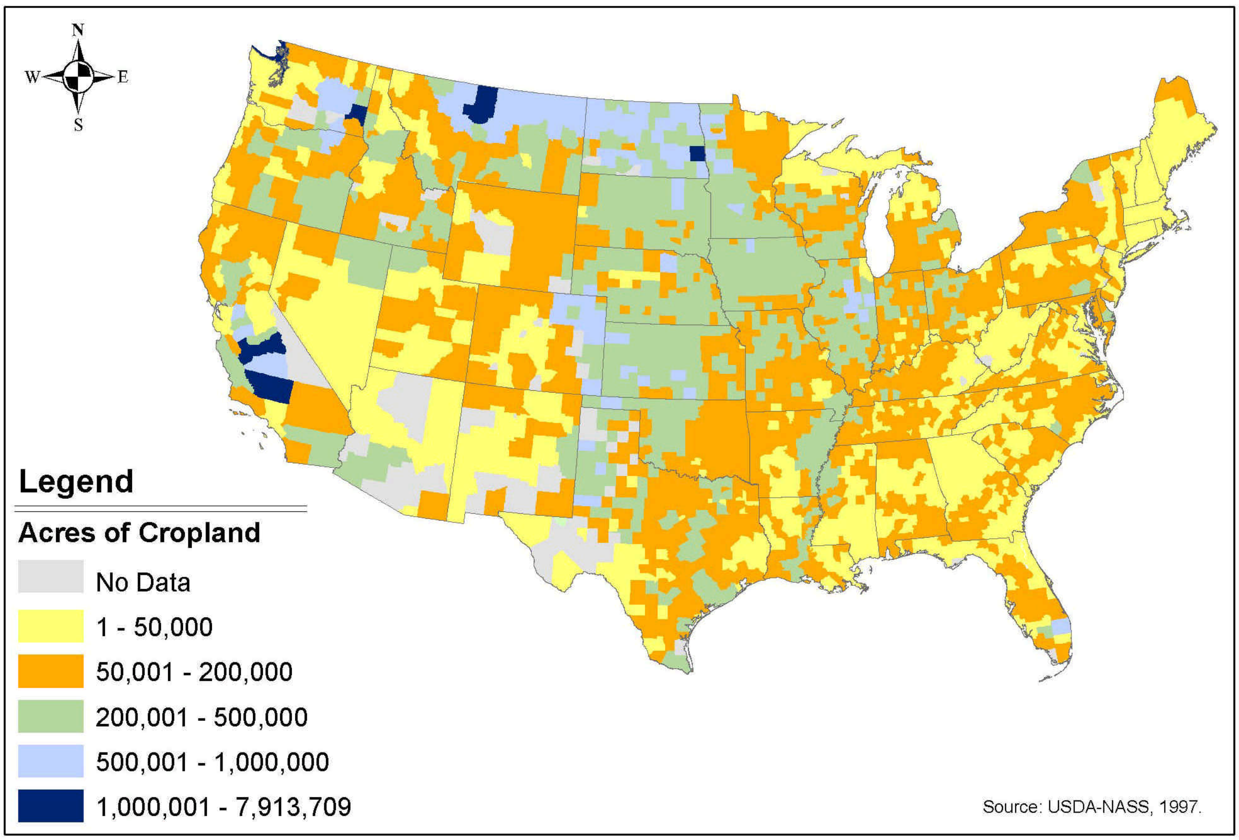


Figure 2.1-3. Acres of Cropland by County

Central Plains

Agriculture in the Northern Plains and Southern Plains (ND, NE, KS, and SD),, is restricted by rainfall in the western portion and by cold winters and short growing seasons in the northern part. About three-fifths of the Nation's winter and spring wheat is produced in this region. Other small grains, grain sorghum, hay, forage crops, and pastures support cattle and milk production. In the southern part, cotton is also a major crop (USDA, 1998).

The Central Plains, while also susceptible to tornados, and to some extent floods, are most times impacted by drought. Drought impacts agriculture in many ways, loss of soil moisture affects plant growth and vigor and makes the soil more prone to wind erosion. Drought also forces producers to be more dependent on irrigation, which puts added stress on limited groundwater supplies.

Mountain States

The Mountain States (AZ, CO, ID, MT, NM, NV, UT, and WY) are suited to raising cattle and sheep. Wheat is important in the northern parts. Irrigation in the valleys provides water for such crops as hay, sugar beets, potatoes, fruits, and vegetables (Figure 2.1-4) (USDA, 1998).

Producers of sheep and cattle who utilize grazing permits in the mountain states are dependent on sufficient forage and permanent watering point for their animals. In times of drought the amount of forage and water available to these sheep and cattle may be severely impacted. Forcing the producer to either move his or her animals to new grazing areas, or physically bring the forage and water to the animals. Wildfires that burn grasslands may impact those producers that use those grasslands for grazing purposes.

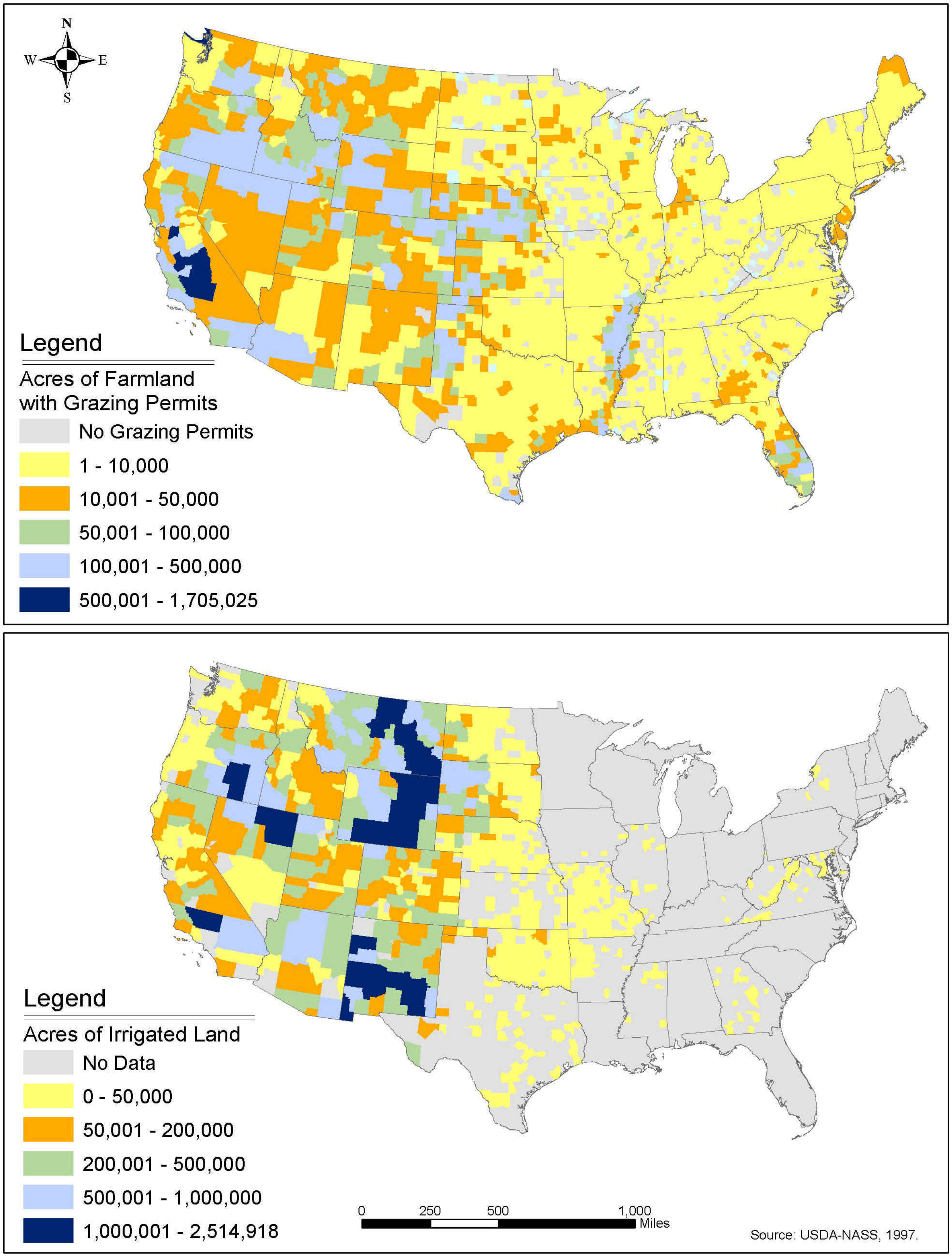
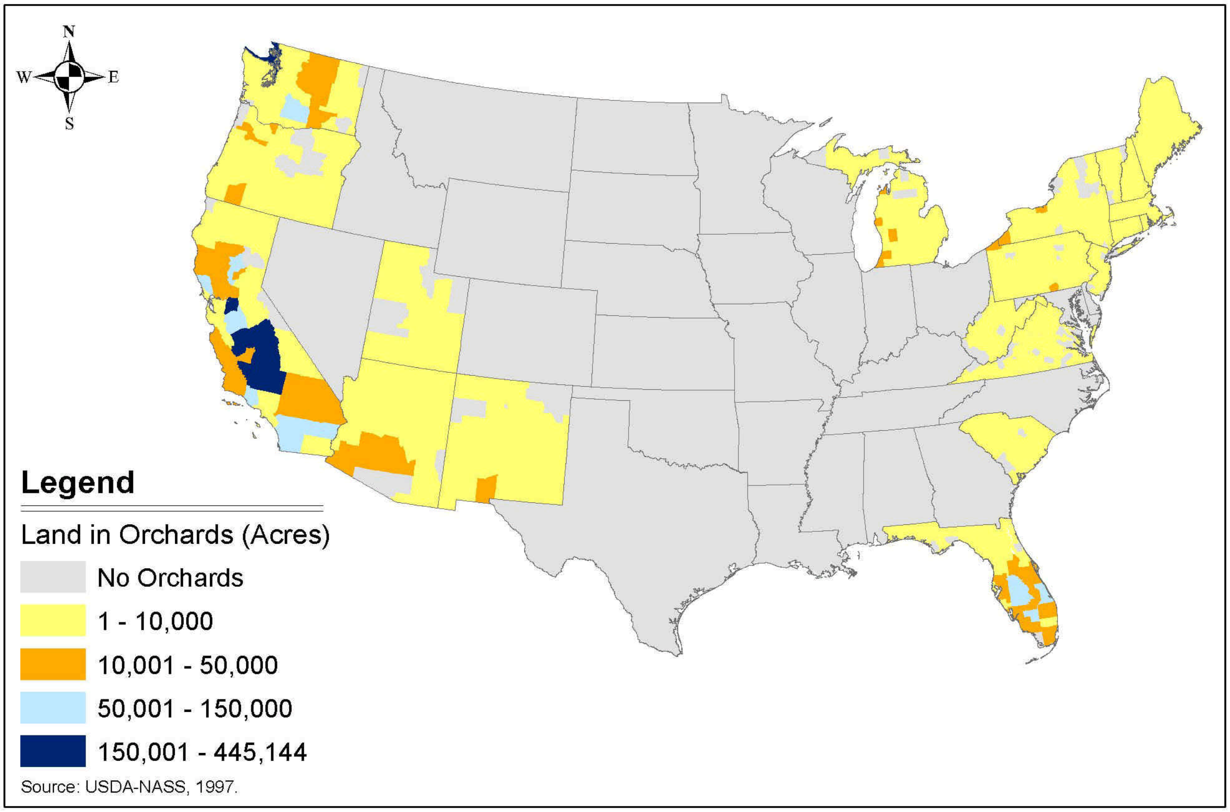


Figure 2.1-4. Acres of Farmland with Grazing Permits, Acres of Irrigated Land by County

The West Coast

Farmers in Washington and Oregon specialize in raising wheat, fruit, and potatoes. Vegetables, fruit, and cotton are important in California (Figure 2.1-5). Cattle are raised throughout the region, and California leads the Nation in milk production. In Hawaii, sugarcane and pineapples are the major crops. Greenhouse/nursery and dairy products are Alaska's top-ranking commodities (USDA, 1998).

One of the main problems facing agriculture in California, Oregon, and Washington is securing a constant supply of water for their extensive cattle and crop needs. The majority of the areas farmed within these states have arid or semiarid climates, making irrigation mandatory for agriculture production. When local water supplies are stressed in times of severe drought most agriculture production suffers. Drought conditions particularly affect orchards and vineyards by affecting the quality of the fruits and also the yield. The stress of drought may also make fruit and nut trees and vines more susceptible to disease.



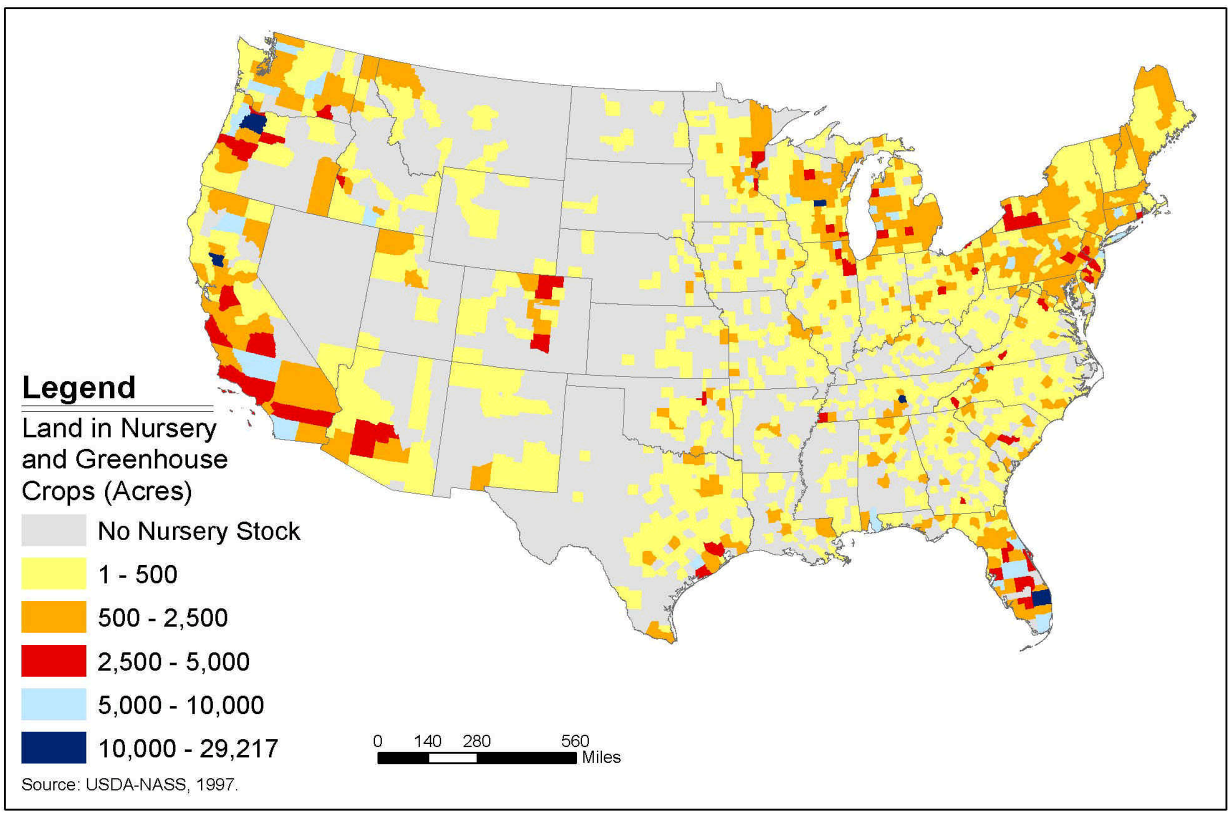


Figure 2.1-5. Acres in Orchards, Acres in Nursery and Greenhouse Crops by County

2.2 ENVIRONMENTAL RESOURCES

When natural disasters such as severe storms, drought, and floods impact farmlands, the effects can be widespread. Not only are the farmlands affected, but also the various ecosystems influenced by the affected farmlands as well as the people whose livelihoods depend on those lands.

2.2.1 Soils

One of the greatest impacts any natural disaster event can have on agriculture is on the quality of the soil. Natural disasters may impact soils in many ways. Flooding may deposit sediment in croplands, smothering plants, and cover up the productive topsoil layer. Erosion from strong winds and rain also may remove the topsoil layer, which may dramatically lower the soil's productivity and water holding capacity. Drought decreases the soil moisture, causing protective plant cover to die and making the soil more susceptible to wind and water erosion. ECP addresses these problems caused by natural disaster events by implementing certain conservation practices after the event in an attempt to return the land to it original productive state.

Five Essential Functions of Soil

1. ***Regulating water.*** Soil helps control where rain, snowmelt, and irrigation water goes. Water and dissolved solutes flow over the land or into and through the soil.
2. ***Sustaining plant and animal life***. The diversity and productivity of living things depends on soil.
3. ***Filtering potential pollutants***. The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.
4. ***Cycling nutrients***. Carbon, nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled through soil.
5. ***Supporting structures***. Buildings need stable soil for support, and archeological treasures associated with human habitation are protected in soils.

Source: NRCS, 2001

2.2.1.1 Soil Quality

Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation (NRCS, 2001). The quality of a soil is determined by a combination of a number of factors: texture, water-holding capacity, porosity, organic matter content, and the depth of topsoil, among others. Soils are primary in all agriculture, for it is the quality of the soil that determines the ability of crops to grow and ultimately set the value for the agriculture land itself (DNN, 2002). The largest impact a natural disaster can impart on agriculture is on the quality of its soil.

In a flood, soils are severely damaged when plant nutrients are leached out of the soil, silts and sands washed onto their surface, forming a crust through which seedlings have difficulty growing, and worst yet, is when the topsoil is removed all together. Erosion-loss of precious topsoil occurs due to wind blowing over unprotected soils, or the flow of water over them. Spring floods have more of an impact on soils because there may be no vegetative cover or crop in the field to hold soil in place (DNN, 2002).

Topsoil can be washed or blown away directly by wind or rain, or made vulnerable to erosion if ground cover is removed through natural forces such as wildfire or drought. Topsoil, rather than subsoil, contains most of the nutrients and organic matter necessary for plant growth. As the topsoil erodes, these nutrients are lost and infiltration rate and water availability become limited. The subsoil does not absorb the rainfall as rapidly, leading to more surface water runoff and less available water for crop production. As a result, productivity of the soil decreases (Al-Kaisi, 2001).

Photo by Lynn Betts, 1999

Figure. 2.2-1. Runoff from a heavy rain carries topsoil from unprotected, highly erodible soils in northwest Iowa.

2.2.1.2 Causes of Erosion

In 1997, the average erosion rate on cultivated croplands caused by water erosion, as determined by Universal Soil Loss Equation on highly erodible lands (HEL) in the U.S. is about 6.4 tons of soil per acre. On Nonhighly erodible lands (NHEL) that average is about 2.4 tons per acre. . Wind soil erosion rates as measured by the Wind Erosion Equation on all cropland for 1997 was 2.2 tons per acre (USDA, 1997). On a local level, this average has the potential to increase during a natural disaster event. Wind and water are the two main agents causing soil erosion. The amount of soil that they can carry away depends on the speed in which they pass over the soil. The faster wind or water is allowed to move across the soil's surface, the amount of soil that can be transported increases, and the more potential it has to erode. During a natural disaster such as a tornado, flash flood, windstorm, or hurricane, the speed at which wind and water moves across the soil surface is greatly accelerated, maximizing the potential for soil loss through erosion. Factors affecting soil erosion by wind and water are:

Photo by Lynn Betts, 1999

Figure 2.2-2. Topsoil blowing in the wind in north-central Iowa.

- *Climate*

  The amount of wind, the intensity and frequency of precipitation, a region's humidity all have the potential to impact soil quality. Lack of water also has an impact on erosion potential. During time of drought, soil moisture is lost, making the soil more friable and thus, more prone to wind erosion. This is compounded by the fact that during times of drought, vegetative cover decreases accelerating the erosion process even more.

- *Soil Properties*
  Some types of soils are more susceptible to erosion that others. For example, a clayey soil is less erodible than a sandy soil. Please refer to the discussion below on erodibility index of soil.

- *Slope*
  Steepness, length, and shape of the slope affect the rates of runoff and erosion. Increasing the steepness of the slope increases the speed of the runoff, which increases the rate of erosion. Increases in the amount of water due to heavy rains or floods flowing down a slope, increases the potential for erosion.

- *Surface Cover*
  The amount of protection the soil has from wind and water erosion depends on the amount of vegetative cover it has. Plant cover is essential in slowing down the erosion process. Plants slow the flow of wind and water across the soil surface, plant roots hold the soil in position and prevent it from being carried or washed away, and the leaves of plants breakup the speed at which raindrops hit the soil and reduce their potential to erode. As a result of a natural disaster, this vegetative cover may be damaged or removed all together, allowing wind and water to reach the soil surface unimpeded, increasing the soil erosion potential.

2.2.1.3 Erodibility Index

The tendency of cropland to erode can be characterized by the Erodibility Index (EI), which is based on soil characteristics, climate, and field topography, the higher the EI, the greater soil conservation effort needed to maintain the sustainability of the soil resource. Cropland with EI values greater than 8 are considered highly erodible because it generally requires a much greater conservation effort to maintain the sustainability of the soil to the level that will sustain crop production indefinitely and erode more slowly (Figure 2.2-4).

Photo by Keith McCall, 1999

Figure 2.2-3. Sediment from sheet and rill erosion in a crop field covers crops at the base of a hill in Iowa.

The areas in the U.S. with the most highly erodible soils lie in the upper Midwest and northern plain states, where some of the nation's most intensive agriculture is located. These areas lie within the Mississippi and Missouri River watershed, which in the past decade have been subject to some sever flooding events and have caused significant impacts on its soil quality. During the great Mississippi flood of 1993, for example, not only was topsoil lost in some areas, but also over 91,000 acres had sand deposits that averaged 24 inches in depth (Dwyer et al., No Date). The northern and central plain states are currently in a period of drought making these soils susceptible to wind erosion.

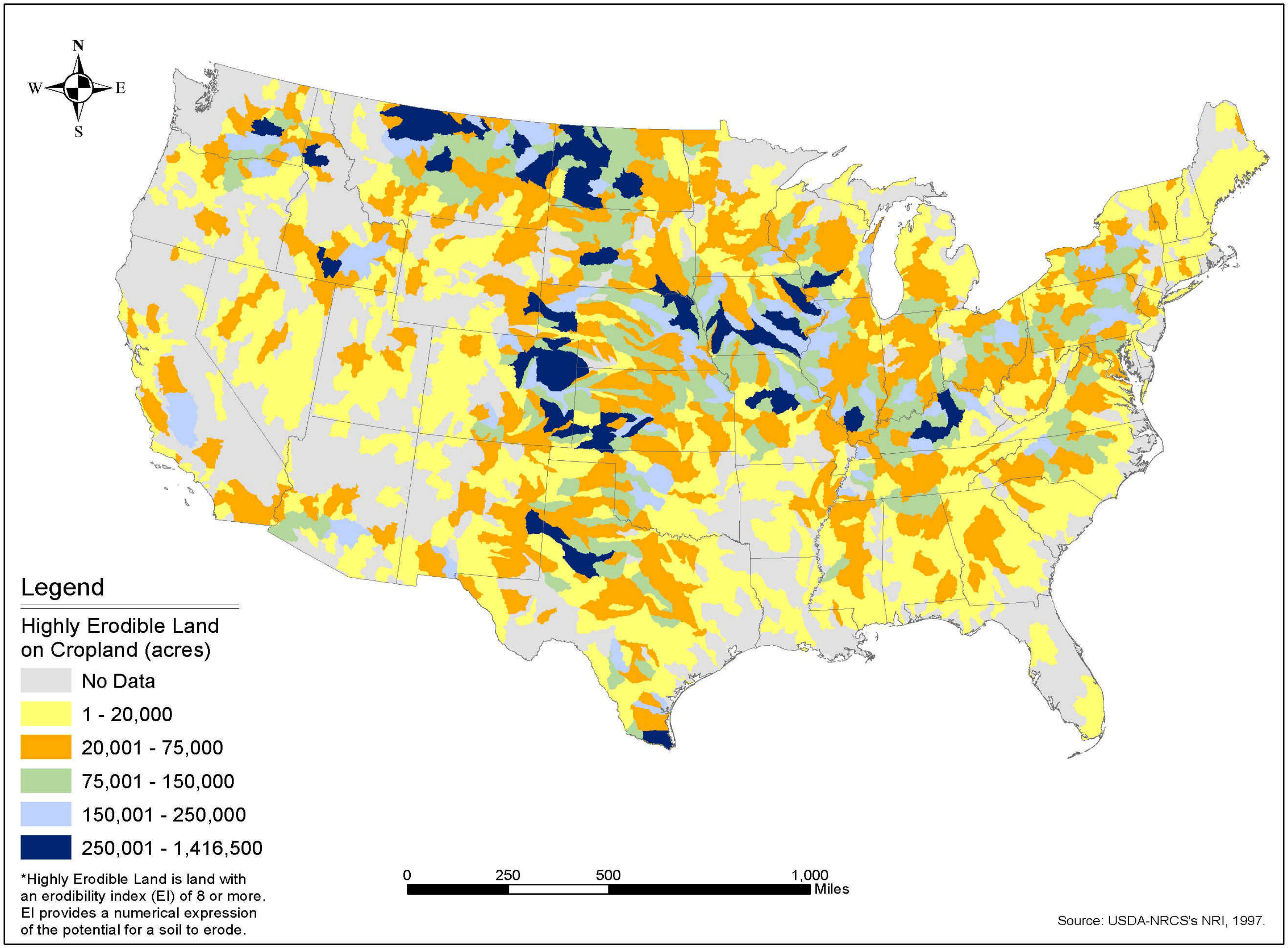


Figure 2.2-4. Highly Erodible Land on Cropland in the United States (acres)

2.2.2 Water Resources

Photo by Tim McCabe, 1983

Figure 2.2-5. Floodwater spills from Obion River in Central Tennessee

Water resources are vital to agriculture and in turn are affected by agriculture. Depending on their intensity and geographic extent within a watershed, crop and livestock production may substantively impact the water quality and water supply. Runoff from farmlands into surface waters may introduce pesticides, excess sediments and fertilizers, adversely impacting the water quality needed to support healthy aquatic ecosystems, human uses of the water, and agriculture itself. Natural disasters can compound these problems with their ability to add massive amounts of runoff quickly in times of heavy rains, or to deplete the water supply in times drought. Flooding may contaminate drinking water supplies or destroy irrigation and other water control structures. ECP primarily addresses those water resource problems associated with water supply. For example, if during a severe drought a rancher could not supply sufficient water to their cattle, with the use of ECP cost share funds the rancher could add new water lines, drill a well, or have water trucked in until the drought is over.

2.2.2.1 Water Quality

Natural disasters have the potential to cause rapid changes in water quality due to the vast amounts of runoff that enters a watershed. The potential for runoff in a certain area is dependant on two factors, precipitation and land surface condition:

- Precipitation:
  The duration, intensity, and the distribution of precipitation are the driving forces dictating how much runoff there can be.

- Land Surface:
  The combination of topography, geology, soils, and land use along with the available precipitation will dictate how much runoff there will be.

In the U.S., the overall runoff potential is greatest in the Mississippi River Valley, Delta and Great Lakes regions (Figure 2.2-6). These high potentials are due to the combination of acres devoted to farming and the moderate to high annual precipitation rates (Figure 2.2-9 Annual Precipitation Map) and the fact that these areas contain high concentrations of HEL (Figure 2.2-4).

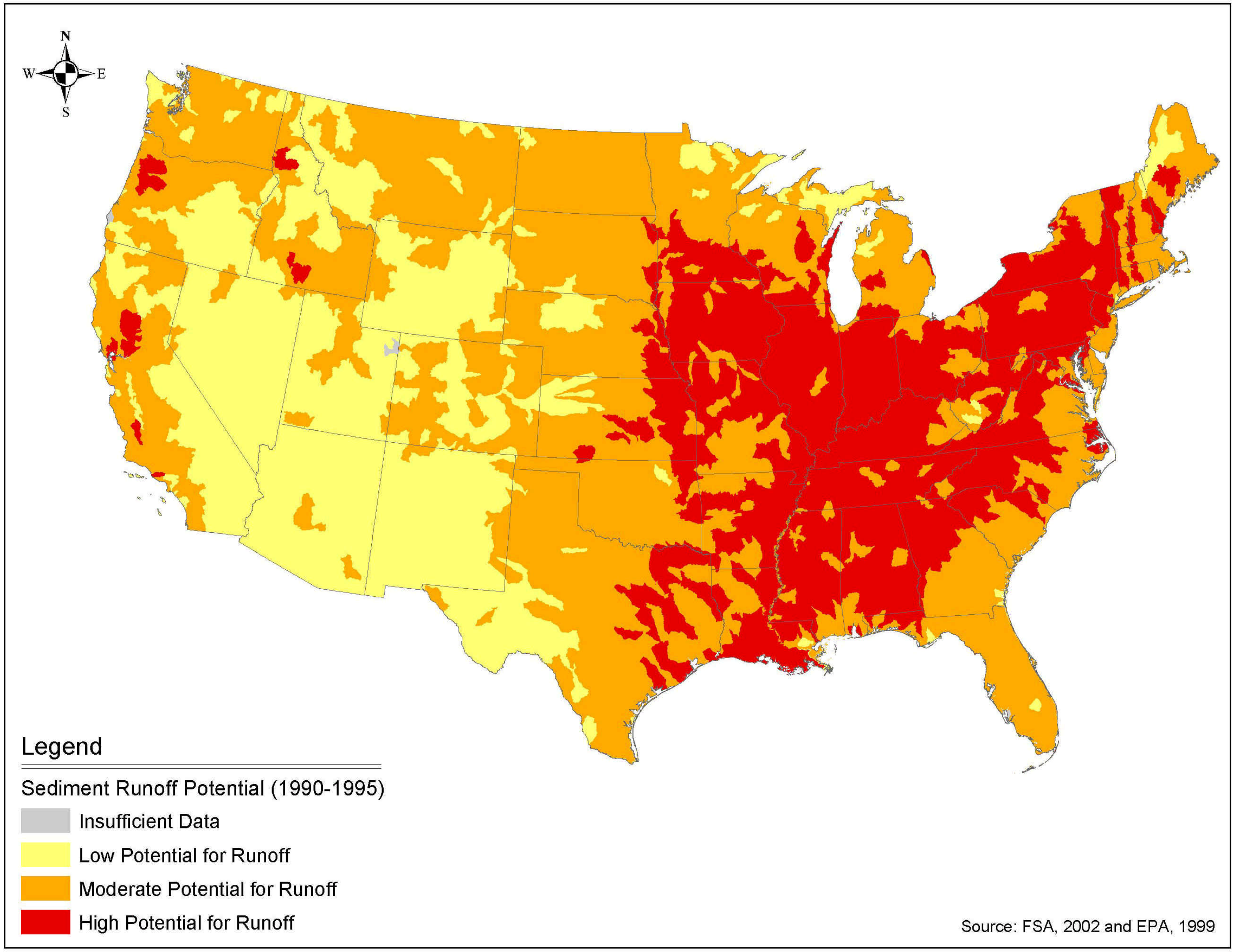
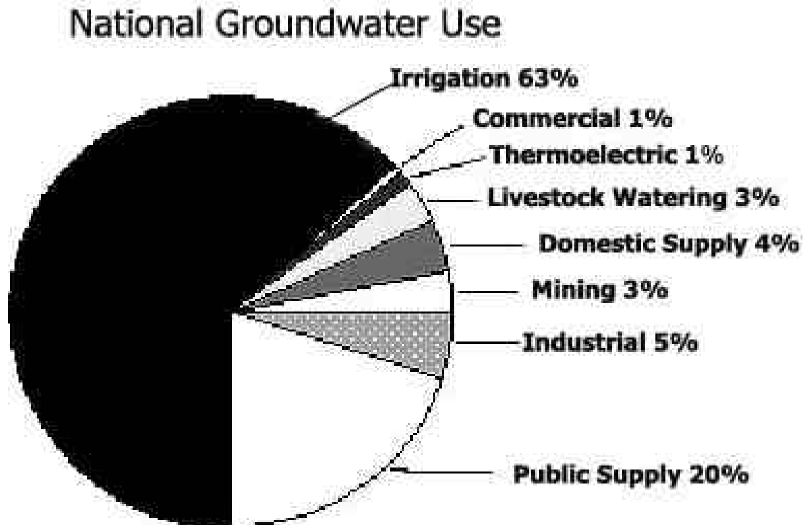


Figure 2.2-6. Sediment Runoff Potential

2.2.2.2 Groundwater

In the United States, approximately 90 billion gallons of groundwater is consumed every day. Groundwater is the water that flows underground and is found in the cracks and crevices between soil, sand and rocks. It is ecologically important because it sustains ecosystems by releasing a constant supply of water into wetlands and contributes a sizeable amount of flow to permanent streams and rivers (Paddock, Todd 1988). More than two-thirds of this amount goes for irrigation, and the remainder is used for drinking water and other domestic uses (Figure 2.2-7). Groundwater is an important source of drinking water for more than half of the people in the U.S. In rural areas, almost all-domestic water is supplied by groundwater (Paddock, Todd 1988). A clean, constant supply of drinking water is essential for every community across the county. Groundwater contamination has serious implications on society because of its need for this water. Agricultural sources, such as animal wastes, fertilizers, and pesticides have a direct impact on groundwater quality and supplies.



USGS Survey Circular 1200, 1998

Figure 2.2-7 National Groundwater Use

Photo by Tim McCabe, 1983

Figure 2.2-8. Damage from drought has caused this corn crop to be stunted and sparse.

<u>Groundwater supply</u>

Over 63 billion gallons of groundwater are used on a daily basis for agriculture purposes (USGS 1993). Farmers are dependant on this water for irrigation and animal production and without it many would not be able to continue. In times of drought, when surface water supplies dwindle, groundwater supplies become strained due to added usage. A drought is a prolonged; unusually dry period when there is not enough water to sustain the normal ecological or agricultural needs of the affected area (NDMC, 2002). The severity of the drought depends upon the degree of moisture deficiency, the duration and the size of the affected area. In agriculture, drought refers to a situation when the amount of moisture in the soil no longer meets the needs of a particular crop. When groundwater supplies get overburdened the impacts on agriculture lands are numerous: wells begin to dry, coastal regions may draw salt water into the aquifer, and sinkholes may form in karst areas. Ecologically speaking, groundwater is important because it is what defines a perennial stream's baseflow and it also supplies water to wetlands (NDMC, 2002). During times of drought if there is not enough groundwater to supplement these ecosystems' water needs, the flows may decrease or they may halt all together, which could have devastating consequences on the aquatic wildlife. ECP helps farmers and ranchers in times of severe drought, when groundwater is scarce or out of reach, by supplying emergency water for irrigation and for livestock.

In the U.S. about 40% of the total area is considered arid, semi-arid, or dry sub-humid. These lands comprise almost half of the continental US west of the 100th meridian, encompassing 17 western states (Figure 2.2-9) (NOAA, 2002).

Currently those areas hit hardest by drought in the United States are in the West and all along the Southeastern seaboard (Figure 2.2-10). The drought conditions in these areas range from severe to exceptional. With droughts of this magnitude the risk of serious environmental damage, particularly through vegetation loss and soil erosion has long-term implications for the sustainability of the area's agricultural industries. Water quality and supply suffers; the health of plants and animals are threatened, soil loss through wind erosion increases, along with the potential for wildfires and dust storms.

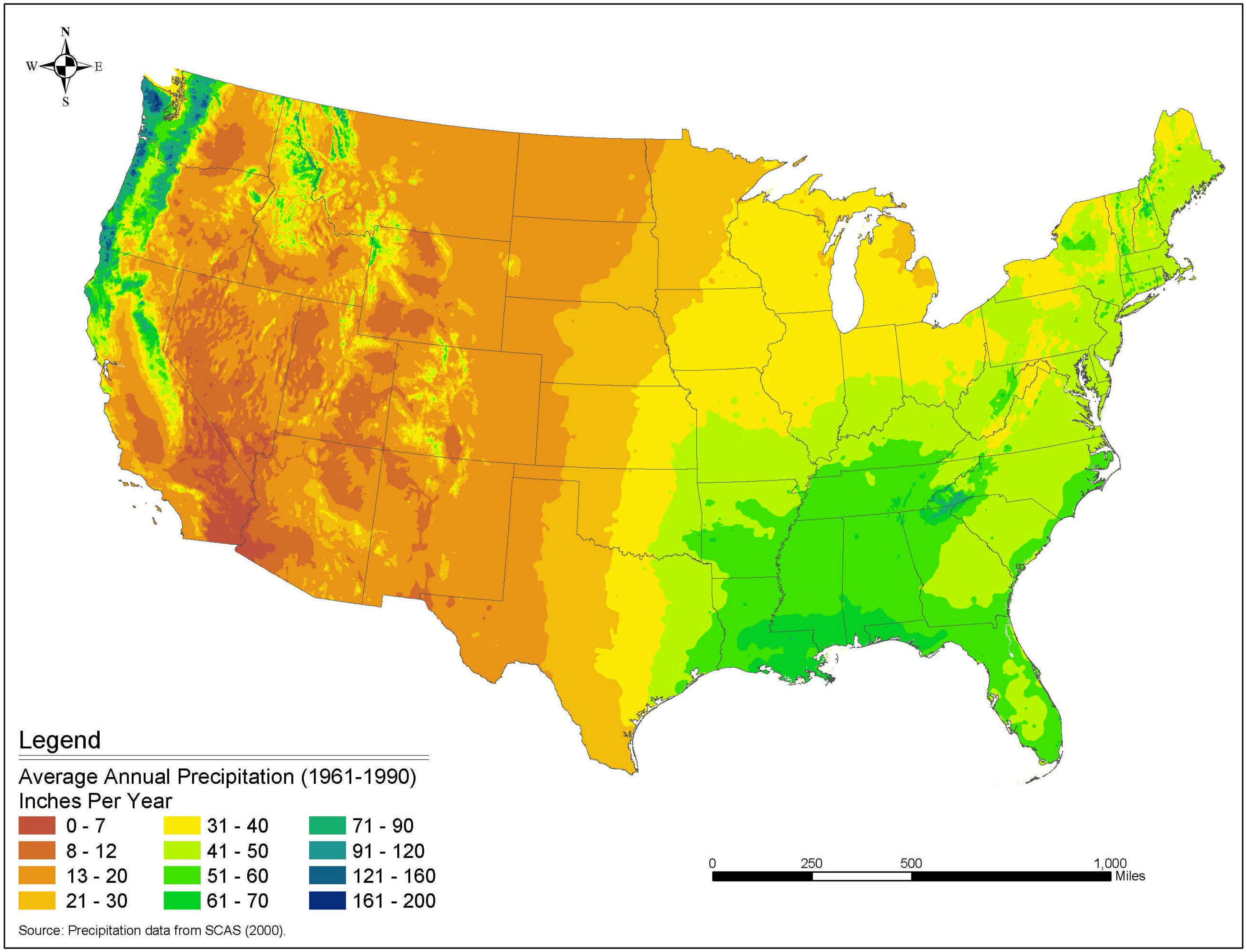


Figure 2.2-9. Average Annual Precipitation (1961-1990)

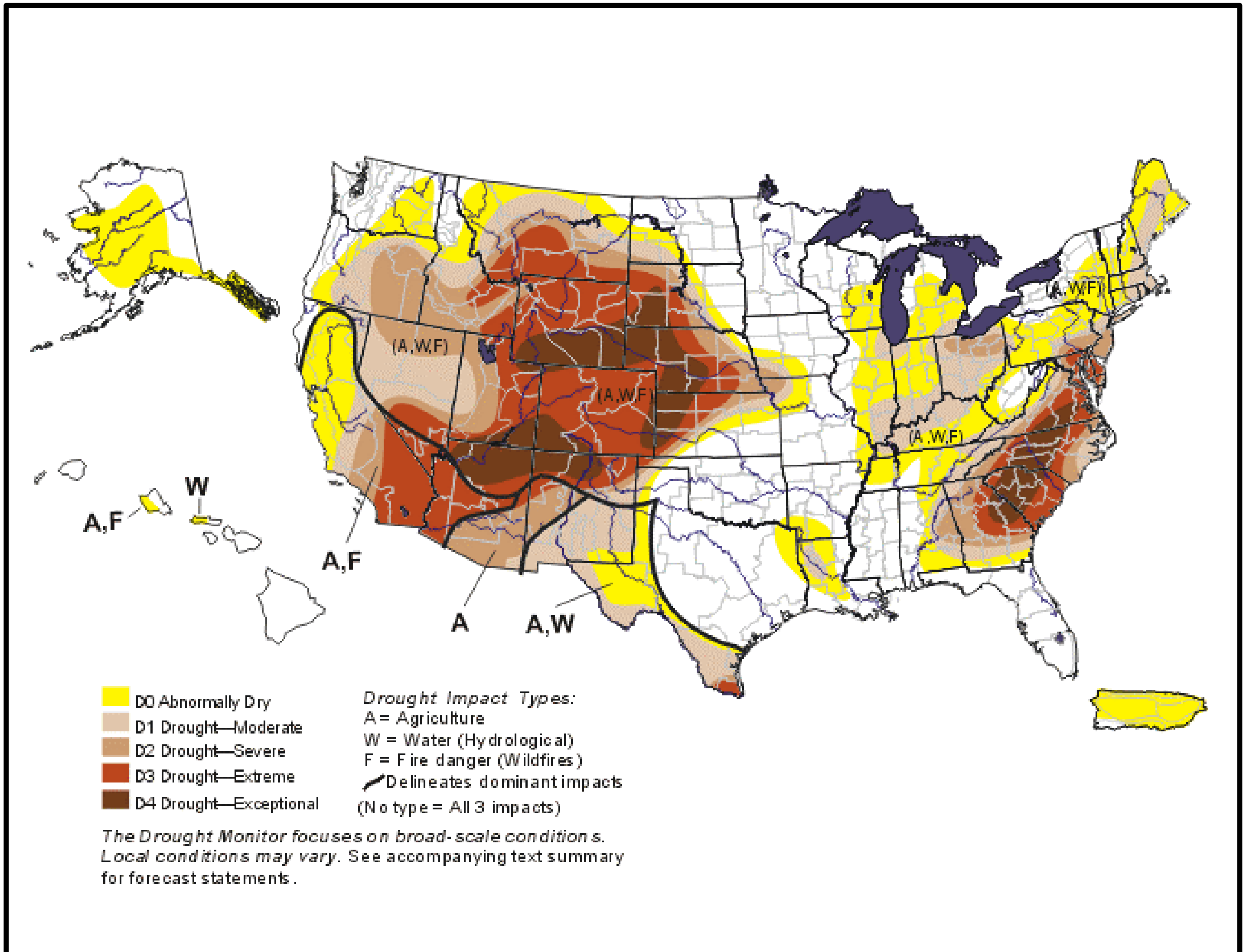


Figure 2.2-10 Drought Conditions in the U.S. for August 2002

2.2.3 Watershed Ecosystems

Agriculture plays a significant role in the natural progression of the hydrology in a watershed. The type of agricultural practices utilized may dictate the flow of water through a watershed. The natural movement of rivers and creeks are altered, and the natural landscape of the watershed is changed when floodplains and wetlands are converted to agriculture production. Dams, dikes, and levees normally work to restrict natural floodplain dynamics and provide for other uses of the land. Breaches in these structures would have both positive and negative effects on riparian, floodplain and wetland communities, as a more natural flow regime would be returned but often in a large, unmanageable volume. Riparian and floodplain vegetation and wetlands might benefit from the more natural hydrology, as flooding in these communities is common. However, the volume of water impounded and the force of water accompanying these breaches would likely be very damaging to any community. Scour, excessive erosion, and uprooting of vegetation would be likely impacts. Sedimentation may fill wetlands, reducing their functionality or possibly destroying them. When flooding occurs in a watershed, those areas inundated by the flood are sometimes covered by debris and sediment. If this process is allowed to continue year after year, a natural floodplain ecosystem will begin to develop. If however, floods occur on certain agriculture lands eligible for ECP, cost-share assistance is awarded to remove that deposited debris and sediment in order to return that farmland back to its original productive state, and the natural progression from farmland to floodplain is successfully halted. ECP funding cannot be used to repair or restore watershed ecosystems damaged by natural disaster events.

Photo by Tim McCabe, 1999

Figure. 2.2-11. An upstream small dam, terraces, buffer strips, grass plantings and other conservation measures are part of a project designed to improve the quality of water entering Union Grove Lake in Tama County, Iowa.

2.2.3.1 Riparian, Wetland, and Floodplain Ecosystems

Floodplains, terraces, and other features of stream systems are formed primarily through erosion, transport, and deposition of sediment by stream flow. Near-stream areas provide much of the energy for stream systems by contributing coarse particulate organic matter. Riparian and floodplain areas serve an integral role in a stream’s production of energy, especially in lower order streams. Floodplains and riparian systems also aid in controlling the sediment and nutrient loads of a system. The vegetation in these areas filters runoff before it reaches the aquatic environment. Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high levels of nutrients, and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of aquatic and terrestrial organisms.

Photo by Tim McCabe, 1999

Figure 2.2-12. Wetland in northcentral Iowa.

Wetlands also serve as natural sponges that trap and slowly release surface water, precipitation, groundwater, and floodwaters. The trees, shrubs, and other wetland vegetation slow the speed of floodwaters and distribute them more slowly over the floodplain. This combined water storage and slowing action effectively lowers the potential for flood heights and reduces erosion. The holding capacity of wetlands helps control floods and prevents water logging of crops. Preserving and restoring wetlands, together with other water retention practices can often provide the level of flood control otherwise provided by expensive dredge operations on levees. (EPA 1995)

<u>Aquatic Species</u>

During flood flows, debris can cause heavy damage to in-stream and riparian areas, including scouring the streambed of benthic habitat, structurally weakening streambanks, and damaging riparian and aquatic vegetation. Debris jams can cause the water to pond behind the newly created dam, leading to saturation and destabilization of streambanks, accelerated erosion, and secondary flooding along the banks. When floodwaters recede, debris left in-stream may cause sedimentation and smothering of bottom habitat by slowing water velocities and may redirect flow to more erodible areas forming new channels and abandoning old ones (Cooper 1997, Darnell 1976).

Stream systems are naturally dynamic systems forming and reforming channels with scour and fill areas, riffles and pools, and rapids and backwaters, in response to the erosive force of stream flow and the resistance of bottom substrate and debris. These dynamics vary depending largely upon a stream's gradient and flow volume and the geology of the bedrock material.

The benefits of debris deposition include creation of new habitat for fish and wildlife with the introduction of submerged woody cover, release of nutrients from woody and other biodegradable debris, and sediment deposition along sandbars, spits and streambanks. Gravel deposits may provide spawning habitat for anadromous salmonids, as well as provide stream channel stability (Kondolf and Swanson 1992).

Rocky debris tends to scour the substrate, fill pools, and alter stream morphology by collecting in the stream channel, while finer debris materials may smoother gravel habitats. The impacts of debris on the aquatic community depend on the characteristics of the debris involved; whether woody debris, finer sediments, sand, gravel, cobble or some combination.

When flooding due to debris jams inundates agricultural lands that contain fertilizers and other compounds, it may increase the occurrence or concentrations of pollutants, nutrients and other chemicals. Effects on habitat structure can vary greatly with the positioning of debris; some debris may improve existing cover or introduce habitat elements that were not there prior to the disaster. However, aquatic habitat may also be covered, damaged, or destroyed by the influx of debris. Channel structure may similarly be improved or damaged, depending on debris-induced changes in the course of the stream or in the substrate. Either situation could negatively affect biotic resources in the stream by altering stream-flow or position or changing the available habitat. Benefits might include the creation of new channels or expansion of previously minor habitats, which may increase some aquatic species populations (Cooper 1997, Darnell 1976).

Nearby riparian areas, floodplains, and wetlands may be affected by debris in the current flood situation or by subsequent flooding resulting from debris jams, by channel course alterations and sediment deposition. Flooding from debris jams may affect habitat, vegetation, and hydrologic function in some wetlands and floodplains communities, depending on flood frequency and duration (Keller and Swanson 1979, Marzolf 1978, and Cooper 1997). Flooding can be of benefit to wetlands and aquatic ecosystems even though it may change species composition or hydrologic function. Although debris deposition modifies topography so that some wetlands are negatively affected, new wetlands and riparian zones can develop. Additional or sustained flooding may change species composition or hydrologic function, as scouring of a riparian area may remove decadent woody vegetation, providing a substrate for seed deposition and germination. Channel course alteration could have substantial effects on streamside communities, as the former floodplain may become drier if the stream moves further away from its previous course. Wetlands and riparian zones that depend on continual or periodic exposure to streamflow will be negatively affected. Lastly, sediment deposition due to in-stream debris may improve habitat conditions, as streambank rebuilding may provide new habitat for riparian vegetation. Deposition of coarse debris in previously fine grain sediment areas can increase structural diversity of the ecosystem and increase biological diversity

Photo by Lynn Betts, 1999

Figure 2.2-13. Sediment-laden runoff from farm fields reaches stream in southwestern Iowa.

The specific characteristics of debris impairments will also vary regionally. Different watersheds will exhibit different levels and types of debris based on the type and amount of material present in the watershed and the type and destructive capacity of the disaster event. For example, a mountainous, forested watershed would have an ample cover of trees and a rocky substrate. Disaster debris in such a watershed would be predominantly woody, with an additional component of cobble, gravel or other rocky materials. The high gradients and fast moving waters of mountain streams create conditions for intense erosive force and rapid, long-distance movement of relatively massive pieces of debris. In contrast, low-gradient agricultural watersheds are affected by large amounts of finer grain sediments, with a substantial component of suspended sediments and a relatively smaller contribution of woody debris. Low-gradient rivers are slower flowing and unable to move rocky debris long distances. However, their high volumes of floodwater can severely damage levees and streambanks, eventually overwhelming streamside environments. Debris in these rivers is often floating woody debris from uprooted riparian vegetation, material from damaged levees, and material from man-made structures in the floodplain.

The creation of debris is also highly dependent on the type of disaster. Floods are the most typical example of a disaster where debris impairments are prominent. Floodwaters carry rocky and woody debris, as described above. Tornados usually leave a narrow swath of damage with multiple types of debris, because they are not generally confined to prescribed paths analogous to floodplains. Damage occurs in any type of environment, from wooded areas to urban centers.

Fish, Mussels and Clams

Aquatic species of most affected by agriculture impacts are those species that require clean, clear water and a substrate relatively free of excessive organic material. When a storm event occurs, sedimentation from runoff, waste from farm animals, fertilizers, and are flushed into rivers and streams creating problems for the plants, mollusks, and fish. Sedimentation can cover up benthic habitat, pesticides may be toxic to aquatic species, and excessive nutrients can cause excessive plant and algae growth, reducing the amount of livable habitat, reducing water clarity, covering up substrate from dead and dying organic material, and decreasing the amount of dissolved oxygen.

Photo by Gary Kramer, 2001

Figure 2.2-14. Salmon rest in a quiet pool before resuming their migration.

Mussels are relatively immobile organisms. They are filter feeders and are very sensitive to long term fluctuations in water quality and quantity. For habitat they require streams and rivers with good water-quality, flow, and a substrate made up of firm sand, gravel or a cobble bottom.

They also require an intermediate host, usually a fish, to which the immature larvae attract to complete their life cycle (NPS 1997).

The decline of mussel populations can be attributed to sedimentation, point and nonpoint source pollution, streambank erosion, toxic spills, and loss of host fish species. Agriculture practices that cause large amounts of sediment to enter streams and rivers can bury gravel and rocky bottoms, and smother mussels (NPS 1997). This sediment often carries pesticides along with it further polluting the water and degrading the mussel's habitat. When fish populations, utilized by the mussels, are lost due to farming, the mussels have no way to reproduce, because these fish act as host to the mussel larvae and are a necessary part in the mussel's reproductive cycle.

North America has the highest diversity of freshwater mussels and clams in the world, with over 300 species nationwide. This group of organisms is considered the most endangered group of animals within the US, with about 70 percent of all the species either extinct or imperiled (NPS 1997). The areas with the highest diversity of mussels are along the Mississippi valley and also in Southwestern Virginia.

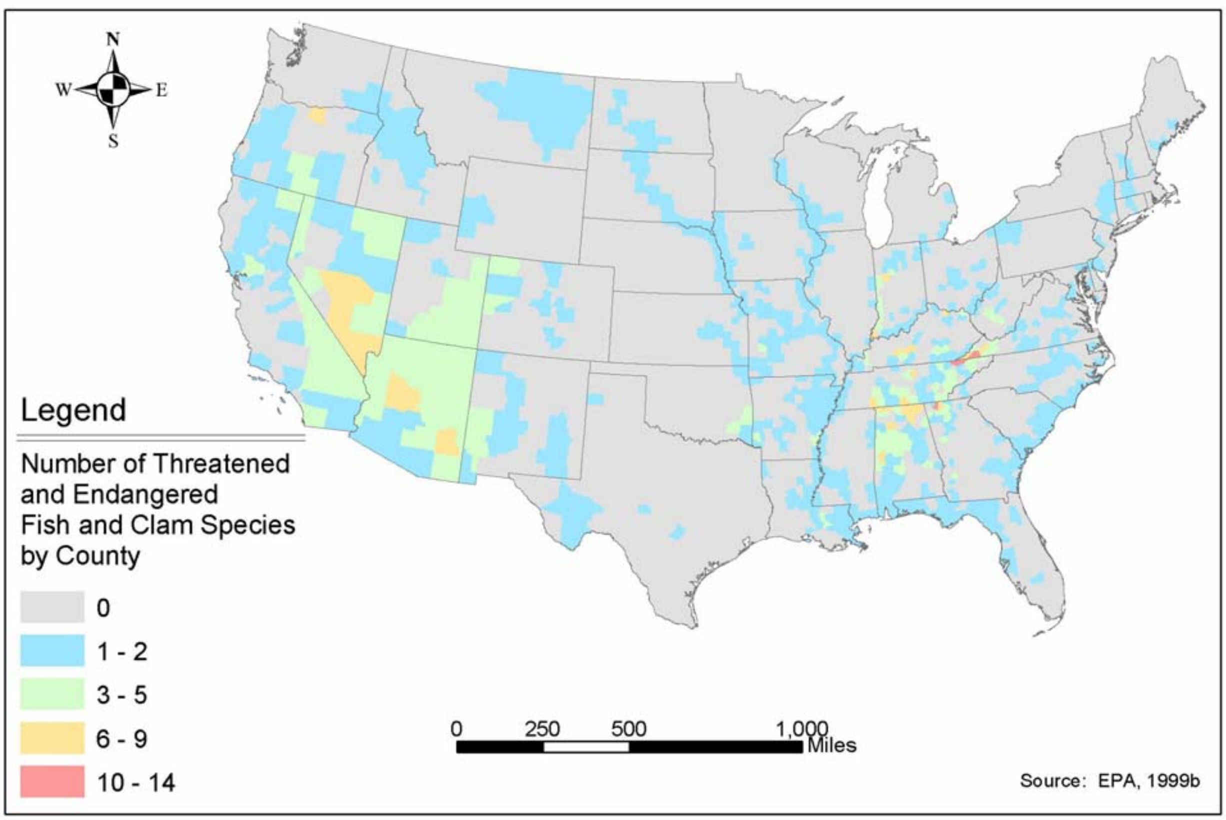


Fig. 2.2-15 Number of Threatened and Endangered Fish and Clam Species by County.

The most widespread area of endangered fish and clam species are found in the southwestern states, and along the Missouri and Mississippi River Valleys (Figure 2.2-15). The highest concentrations (most number of threatened or endangered species per county) however, are found in Southwestern Virginia and Northeastern Tennessee within the Tennessee River Watershed.

2.2.4 Natural Vegetation

Areas of natural vegetation are used in agriculture for many purposes, such as for soil conservation practices, pastures, grazing areas, and riparian buffers. Even though in some instances natural vegetation is more resistant to the impacts of natural disasters than many agriculture species, they are still susceptible and damage can occur. If these areas of natural vegetation are considered lands in agricultural production and damage from a natural disaster event occurs, that if not treated, impairs or endangers the land, materially affects the productivity of the land, represents unusual damage that does not occur frequently, or is so costly to repair that federal assistance is required to return the land to productive agriculture use then these areas could be eligible for ECP funding it they are considered agriculture lands.

2.2.4.1 Native grasses

Native grasses are the various regional and national grasses that were original to particular areas of the United States. They are being used more and more in a return to naturalized plantings, now being favored on cropland through out the country. These species, through evolution, have developed resistances to many of the problems that the newer varieties have not successfully been bred to handle, such as resistance to drought, and coping mechanisms to wildfire. Characteristics of native grasses are regional in regards to soils, acidity or alkalinity, climate, diseases, and symbiotic coexistence with other plants in the surrounding area. Native vegetation is the most logical planting to use in low-maintenance areas because it does not require maintenance by high fertilization, soil additives, watering, or insecticides. Fungicides are generally not needed because of the adaptability of native grasses to fight back, and once established and managed properly, they can effectively keep weeds from ever becoming established. They are the best vegetative cover for erosion control purposes and for reintroduction of habitat that has been ruined due to their deep root depth and stability after establishment.

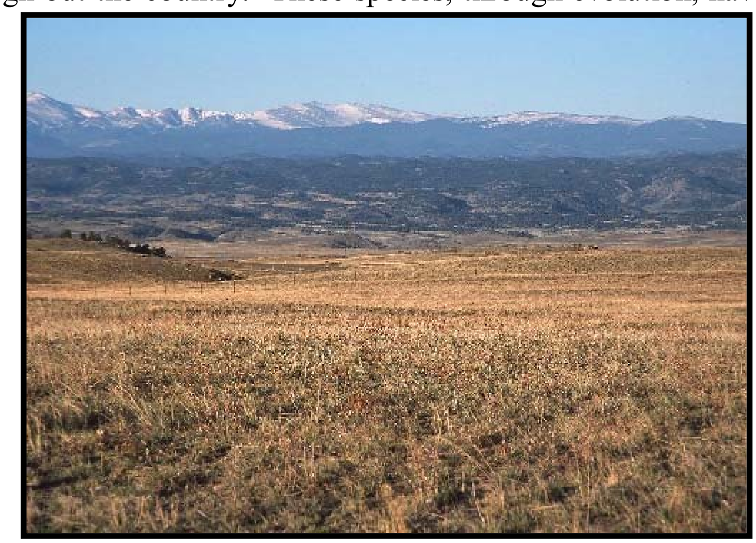


Photo by Jeff Vanuga, 2002

Figure 2.2-16. Grasslands in northern Larimer County, Colorado.

Native grasses are planted in the U.S. for a variety of reasons. They adapt well to marginal soil types within their home range, provide dependable forage and cover production, require low maintenance (pesticide and herbicide treatments are generally not required), provide excellent soil-holding capabilities and drought tolerance in response to their deep root system, and increase soil fertility from regeneration of the root system. They also benefit wildlife by providing nesting cover, supporting seed and insect populations, and remaining erect during winter months, thereby offering winter cover and shelter.

Native grasses are commonly referred to as 'warm-season' grasses, due to their inherent ability to thrive in warm climates during the heat of the summer, which is when they put on most of their growth. These native grasses comprise three types of prairies located in this country. The tall grass prairie is the wettest of the grassland types located in the eastern portion of the Midwest, receiving approximately 95 cm of precipitation a year overall. This prairie once covered millions of acres, but now is present only as scattered remnants within the historic range. Adjacent to this prairie, westward, is the mixed grass prairie in the Midwestern U.S., followed by short grass prairie, which borders the Rocky Mountains and receives approximately 40 cm of annual precipitation. The short grass prairie can provide a natural defense against drought and soil erosion, while also providing diverse habitat and cover for large ungulates, upland birds, and threatened and endangered species. However, much of this prairie type has become fragmented and has, therefore, lost most of its natural ecological strength. Refer to Figure 2.2-17 for the current the range of native grasslands in the U.S.

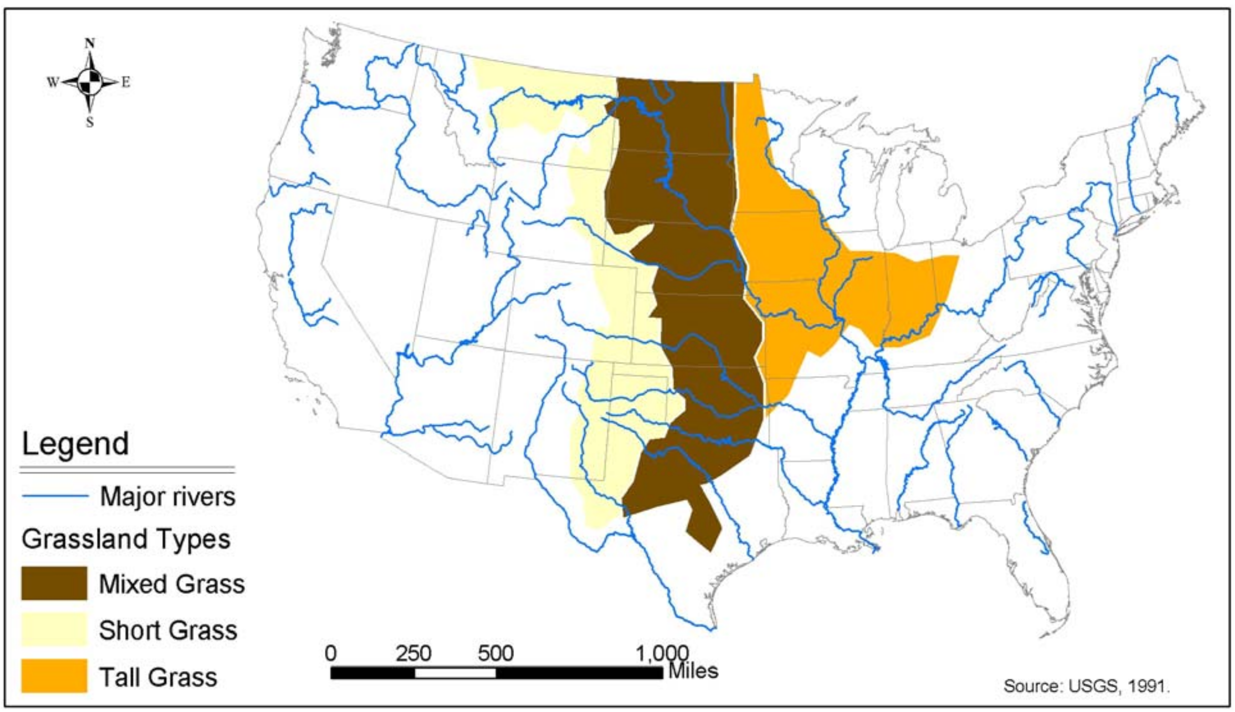
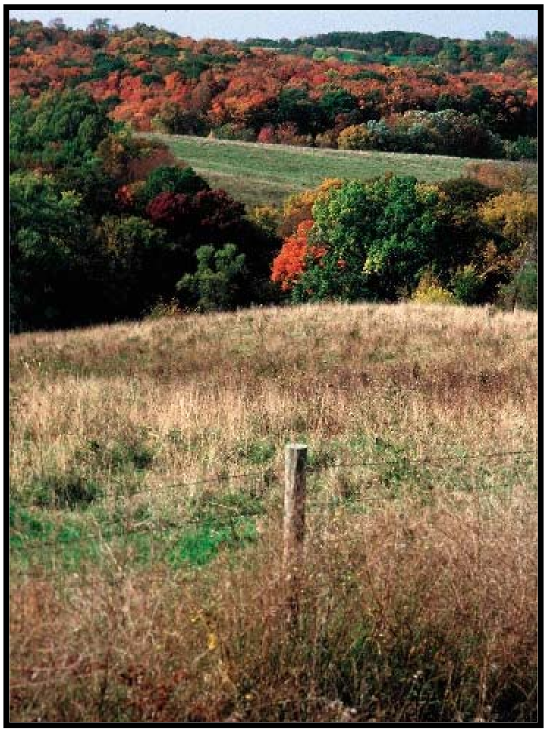


Figure 2.2-17. Range of Native Grasslands in the U.S.



Colleen Schneider, 1999

Figure 2.2-18 Forests northeast Iowa.

Forestlands

Tree cover reduces flooding, replenishes water tables, conserves and stabilizes soil, and enhances both game and nongame wildlife habitat (Please refer to Fig. 2.2-18 for national distribution of woodlands across the U.S.). Trees can prevent stream bank erosion, increase oxygen levels, reduce greenhouse gases, and help provide better air quality. Thus, forests cleanse surface water runoff of silt and pollutants, thereby protecting and improving streams, while at the same time providing food and shelter for wildlife. By reducing evaporation rates and providing shade and buffers against wind, forests can offset the effects of weather. They are however, not immune to the impacts of natural disasters. Forestlands are susceptible to damage from high winds, wildfire, tornados, and hurricanes. However, while many times forestlands are utilized in agriculture for all the benefits that they provide, areas devoted to timber production, Christmas trees, or naturally forested areas associated with farmlands are not eligible for ECP funding. However ECP does provide funding for the purchase and planting of tree seedlings or young shrubs used for field windbreaks or farmstead shelterbelts.

2.2.5 Wildlife

Agricultural land use is a contributing factor leading to the cause of habitat alteration and habitat loss leading to species endangerment, but the exact causes can be considered variable. Some of these causes contribute to the loss of grasslands, wetlands, and surface water degradation. In an effort to improve the nation's natural resources, agricultural conservation programs have stepped-up to dramatically improve the health and size of wildlife populations around the country. Management of private lands, good stewardship, and creating ideal environmental habitat conditions provides agricultural conservation programs with the tools needed to produce positive wildlife impacts through the various regions and ecosystems within the United States. The combined size of new wildlife

Photo by "Unknown"

Figure 2.2-19. Ringneck Pheasant in Cornfield

habitats is twice as large as the National Wildlife Refuge System and all state-owned wildlife areas in the contiguous 48 states combined (Brady, 2000). However, when these agricultural areas associated with wildlife habitats are impacted by natural disasters such as droughts, fires, or floods they have the potential to denude large areas of vegetation growth. These vegetative areas are essential for wildlife habitat; they provide a source of food, cover, and security. However, in the event these wildlife habitats associated with agriculture are impacted by a natural disaster, they would be ineligible for ECP funding (See Appendices A & B for detailed discussion on eligible lands). Areas of wildlife habitat adjacent to farmlands can be affected by ECP practices several ways. Debris removed from farmlands can be deposited on these areas either covering up habitat, or if the debris is woody material and is piled on these areas, habitat may be created for some species. In times of drought when emergency water measures are taken, water is diverted for agricultural use, and away from wildlife habitat and areas of natural vegetation. Reshaping or grading of land may, for a brief period, increase runoff, adding excess sediment into adjacent water bodies, impacting aquatic wildlife.

2.2.6 Air Quality

Agriculture can have significant temporary impacts on air quality due to the physical and chemical impacts farming have on the land and the vast amounts of acreage devoted to farming nationwide. Agricultural practices and associated field operations are directly linked to air quality degradation. Adverse air quality impacts from agricultural practices and associated field operations include smoke produced during burning operations, airborne chemicals, pesticide application (especially aerial applications), and methane gas (released from feedlots and dairy farms). Air quality can be affected greatly by certain natural disaster events such as wildfires and duststorms caused by high winds and drought conditions. While ECP does not have any programs that directly deal with improving air quality, they indirectly address the problem through the implementation of numerous emergency conservation practices aimed at rehabilitating lands affected by such disasters and with emergency measures taken to control wind erosion.

Photo by Lynn Betts, 1999

Figure 2.2-20. Topsoil blowing in the wind in north-central Iowa.

2.3 ECONOMIC AND SOCIAL RESOURCES

The analysis of impacts to economic, social and cultural resources provides a mechanism for the identification, comparison and evaluation of the effects of significant policy actions or regulatory practices before these effects can occur. The intent is to identify those elements of the socioeconomic environment that are sensitive to changes that may result from the proposed alternatives. Specifically, the assessment considers how these actions might affect individuals, institutions, and the larger social and economic systems of the various individuals or communities affected by the ECP program.

ECP is available to any person who is the owner, landlord, tenant, or sharecropper on a farm or ranch that incurs a portion of the cost associated with an approved conservation practice in a disaster area. The ECP provides cost-share assistance to farmers and ranchers for the rehabilitation of farmland on which normal farming operations have been impeded by wind erosion, floods, hurricanes, or other natural disasters, and for the implementation of emergency water conservation or water enhancing measures during periods of severe drought. Water conservation or enhancing measures may include water both for livestock and for existing irrigation systems for orchards and vineyards.

The description of the affected environment for the analysis of socioeconomic effects of the ECP provides a summary of the cultural, social and economic characteristics within a designated area or social community. Through various mechanisms, the ECP program has the potential to directly affect the structure and practices of individual agricultural producers or indirectly, to affect the characteristics, social patterns and economies of agricultural communities, both rural and urban. These communities represent the object of any direct effects associated with the demographic, economic, and fiscal impacts resulting from the proposed action that could reasonably be expected to have some influence on the social community.

At the programmatic level, the affected environment is a generalization of the social and economic characteristics associated with agricultural producers and the social communities that are dependent on or influenced by agricultural production. Consistent with the agricultural base of the programs under consideration here, the communities typically affected will be smaller and non-metropolitan in character.

However, agricultural production is not confined to primarily rural areas. Urban farms now constitute an estimated 33 percent (726,000 farms) of all U.S. farms and encompass 16 percent of all cropland (CAST, 2002). Suburban and urban fringe communities that contain or are adjacent to cropland acreage may also be affected. Larger more metropolitan communities may also be indirectly affected either as the result of any environmental improvements associated with the program; by any payments made to absentee landowners or farmers who reside in these areas; or by program influences on the larger agricultural economy of the U.S.

2.3.1 Social Characteristics of U.S. Farmland Communities

Both historically and in contemporary America, agriculture plays an important role for economic and social development. Of the total 3066 counties in the continental U.S., only 34 contained less than 1000 acres of farmland. The influence of agricultural production in the U.S. is experienced in both rural areas where base agriculture is located, as well as in the economies and lifestyles of non-farm areas.

2.3.1.1 The Structure of Agricultural Production

The world's largest producer of crops, livestock and poultry, the U.S. supported a total of 1,911,859 farms, involving a land area of 931,795,255 acres in 1997 (USDA, 1997). However, the structure and practice of farming in the U.S. has changed dramatically over the past century. As late as the 1930's, farms, farmers, the farm household, and farming communities were relatively homogeneous and intertwined (USDA, 2001). However, in the ensuing 70 years, the structure of farm operations has undergone substantial changes. Along with other economic and lifestyle changes, technical advances in farming and the globalization of commodity markets have led to an increasing diversity and concentration of farm operations.

Farm Typology Groups Defined

SMALL FAMILY FARMS (sales less than $250,000):

Limited-resource Producer: Any producer with an annual gross income of $20,000 or less derived from all sources, including income from a spouse or other members of the household, for each of the prior 2 years; or less than 25 cropland acres aggregated for all crops, where a majority of the producer's annual gross income is derived from such a farm or farms, but the producer's annual gross income from all farming operations does not exceed $20,000.
Retirement. Small farms whose operators report they are retired (excludes limited-resource farms operated by retired farmers)
Residential/lifestyle. Small farms whose operators report a major occupation other than farming (excludes limited-resource farms with operators reporting a nonfarm major occupation).
Farming occupation/lower-sales. Small farms with sales less than $100,000 whose operators report farming as their major occupation (excludes limited-resource farms whose operators report farming as their major occupation).
Farming occupation/higher-sales. Small farms with sales between $100,000 and $249,999 whose operators report farming as their major occupation.

OTHER FARMS:

Large family. Farms with sales between $250,000 and $499,999.
Very large family. Farms with sales of $500,000 or more.
Nonfamily. Farms organized as nonfamily corporations or cooperatives, as well as farms operated by hired managers.

Source: USDA ERS, 2000

Since the beginning of the twentieth century, the ownership and control over agricultural assets has been increasingly concentrated into fewer and larger entities (USDA, 1998). The introduction of mechanized processes and advanced technologies along with the introduction of government price supports have combined to encourage farmers to increase the size of their farms in order to gain production efficiencies. The large capital expenditures required for contemporary farming encourage increased specialization, and the production of larger quantities of a limited number of products (USDA, No Date).

The Economic Research Service (ERS) has developed a farm typology that categorizes farms into homogeneous groups that describe the range of U.S. farms (USDA, 2000). Based on this typology, 91 percent of all American farms are classified as small farms for the year 1998 (see inset). These small farms account for approximately 68 percent of the nation's total farm assets and land. However, large farms, very large farms and corporate farms account for approximately 66 percent of total production (USDA, 2001).

Although the number of farms and the total farmlands has decreased during the decade from 1987 to 1997, the average farm size has increased from 462 acres in 1987 to 487 acres in 1997, approximately 5 percent. According to Gale (2000a) this increase is due in part to the need for farm operators who earn their primary living from farming to seek to expand their farms in order to cover fixed costs and still earn significant income. Gale also notes a rise in the number of small farms whose operators earn a substantial portion of their income from non-farm activity. By contrast, the number of new farm start-ups by younger entrants to farming is showing a steady decline.

Farm Tenure

As farming operations have become more concentrated and farming practices more intensified, the need to access additional crop acreage has induced more farmers to adopt leasing as a land acquisition strategy. In 1997, 41 percent of the total farm acreage in production was leased. Of this land 29 percent was leased to tenants (who rent all the land they farm) and 71 percent was leased to part owners (who own some portion of the land they operate, but also rent additional land) (USDA, 2001c).

However, both the number of farms and the total farm acreage in full ownership has increased during the five-year period from 1992 to 1997. This would indicate that at least some portion of the decrease in individual farms and in the total land in farms could be attributable to a decrease in tenant farming operations during this period. The number of farms and total farmland acres in various ownership types is illustrated in Table 2.3 -1 for the years 1992 and 1997.

Table 2.3 -1 Acreage and Tenure of Farm Operators (1992 and 1997)

	Total (percent)	Full Owner (1) (percent)	Part Owner (2) (percent)	Tenant (percent)
Number of Farms 1992 (3)	1,925 (100.0)	1,112 (57.7)	597 (31.0)	217 (11.3)
Number of Farms 1997 (3)	1,912 (100.0)	1,147 (60.0)	574 (30.0)	191 (10.0)
Land in Farms 1992 (4)	946 (100.0)	296 (31.3)	527 (55.7)	123 (13.0)
Land in Farms 1997 (4)	932 (100.00	316 (33.9)	508 (54.5)	108 (11.6)

(Source: USDA, 2001)

Note: (1) Full owners own all the land they operate.
(2) Part owners own a part of the land they operate and rent the remainder from others.
(3) Numbers are presented in thousands ('000s) so that 1,925 = 1,925,000 farms.
(4) Numbers are presented in millions of acres, so that 946 = 946,000,000.

Farm Income

The median farm household income in 1997 was $52,347 (USDA, 1999). This is similar to, but slightly higher than that for U.S. households. Figure 2.3-1 below provides the average farm household income by state. The breakdown of income for the average farm household in 1997 includes: farm income, 11.4 percent; wages and salaries; 53.9 percent; off-farm business, 12.1 percent; interest and dividends, 6.8 percent; and other sources, 15.8 percent (USDA, 1999).

Approximately 43 percent of all farm households had a primary off-farm occupation that contributed to household income. Off-farm income is derived from sources such as wages and salaries from off-farm employment; the proceeds of an off-farm business, or unearned income such as interest, dividends, insurance or annuity payments. The proportion of farm income derived from various sources depends on the size and type of farm (see inset). Generally, as farm income and average household income increase, the proportion of that income that derives from off-farm sources decreases (USDA, 1999).

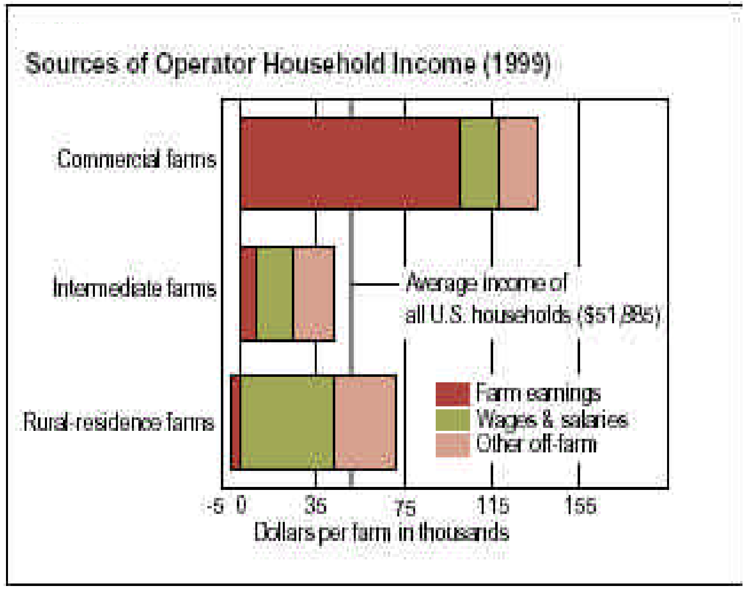


Figure 2.3-1 Sources of Operator Household Income (1999).

Risk and Capital

In addition to its land and labor requirements, farming is a capital-intensive industry. Land acquisition, land improvements, capital equipment and production inputs all require large capital outlays. However, farm operations are less likely to have control over the market price of commodities produced or production inputs such as fuel, fertilizer, chemicals, seed, or livestock. The level of uncertainty in prices, yields, government policies, and foreign markets means that risk is an important component in farming operations (Dismukes and Vandeveer, 2001).

Natural phenomena also represent a significant risk to farming operations. Natural disasters such as drought, hail, flood or erosion can destroy entire crops or render cropland unproductive. The combination of natural and market price uncertainty contributes to the high level of risk associated with farming. Coupled with the substantial investment in fixed assets and production costs required for most farming operations, the risks associated with farming as an economic enterprise remain high.

Federal Payments to Agriculture

Government payments to farmers represent one mechanism by which the risks associated with agricultural production can be minimized. Crop support, loan and other payments based on commodity production levels or quotas may be used to reduce risks associated with market price. Insurance and other emergency payment programs, such as ECP address many of the risks associated with natural phenomena, including natural disasters. The Census of Agriculture reports that approximately 36 percent of all farms received government payments in 1997. For the two-year period from FY ’97 to FY ’99, the ECP program ranked tenth among all agricultural programs in terms of total amount spent, with an average annual outlay of $69.2 million (Zinn, 1999).

2.3.1.2 Characteristics of Agricultural Communities

In many instances, rural communities and agriculture are considered together. Rural communities tend to have certain characteristic structures, social patterns and cultural practices in common, but there is a degree of diversity within the rural community as well. Rural communities have undergone a shift from dependence on farming and farming related activity (ERS, 1995) to a more diverse economic base. Of the 2,259 non-metropolitan counties classified by the ERS typology in 1989 (Cook and Mizer, 1994), 556 were identified as farming-dependent; that is that farming contributed a weighted annual average of 20 percent or more of total labor and proprietor income over the previous 3 years (Figure 2.3-2).

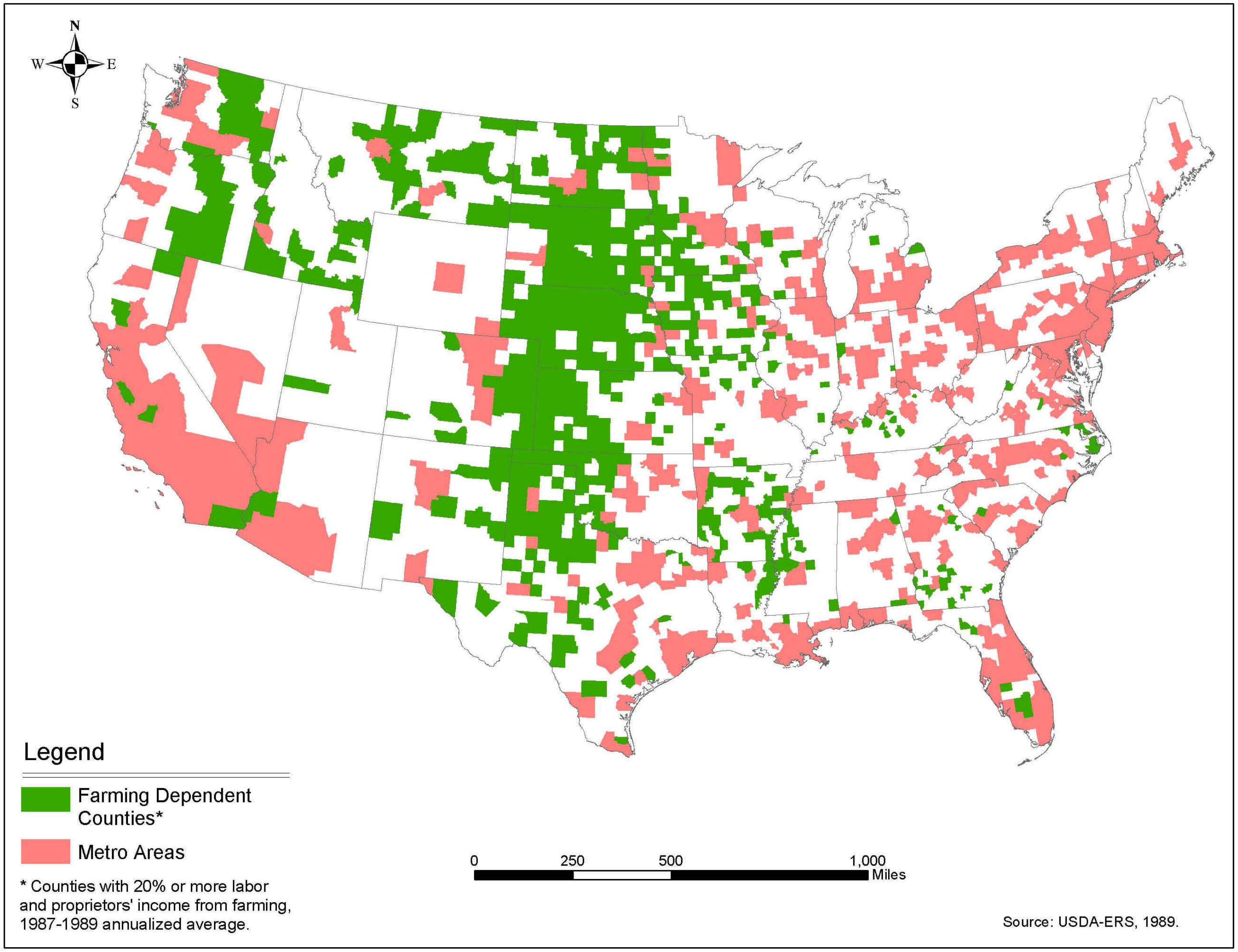


Figure 2.3-2 Farming Dependent, Non-metropolitan Counties in the U.S. (1989)

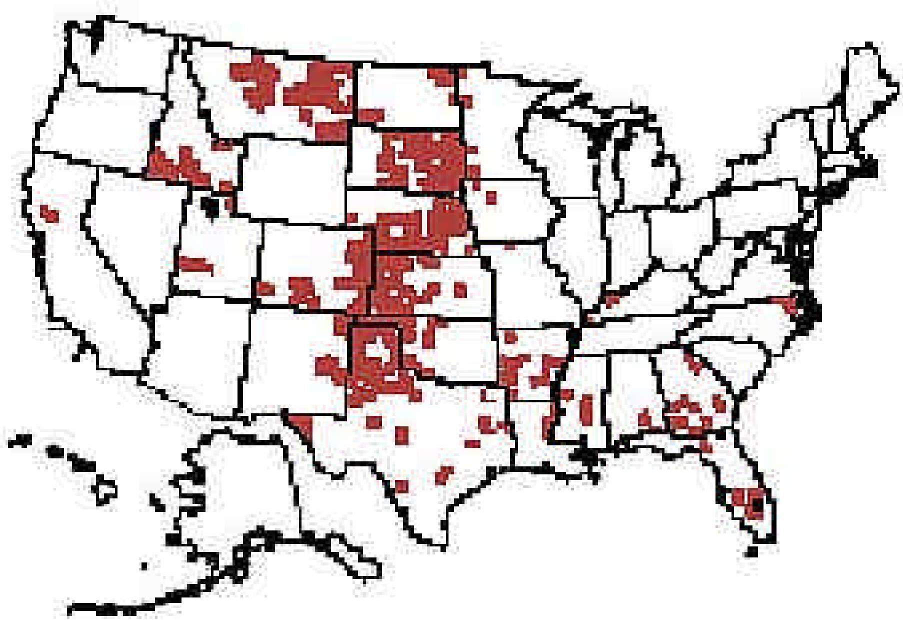


Figure 2.3-3 Farming Dependant Counties 1999 (USDA 2001*)*.

The expansion of the U.S. economy during the decade of the 1990s has reduced the number of farming dependent counties in the U.S. (Gale, 2000). By 1999, only 258 counties were classified as farming dependent (USDA, 2002). However, although fewer communities rely on farming, it remains a major income source and defining characteristic for rural communities, especially those in the Central and Midwest portions of the country (Figure 2.3.-3).

Farming-dependent counties are primarily concentrated in the Great Plains; the western portions of the Midwest; the southern U.S., including parts of Eastern Texas, Oklahoma, the Mississippi Delta; and the coastal plain of Georgia. The remaining counties are located mostly in the northwestern States.

Nationally, the total number of farms has decreased by 8.5 percent over the previous decade, from 2,087,759 in 1987 to 1,911,859 in 1997 (USDA, 1997). This decline slowed somewhat during the latter half of the decade during which the number decreased by less than one percent and reversed the trend of the previous 15 years in which almost 30,000 farms were lost nationwide (Gale, 2000a). Correspondingly, the total land in farms has also been reduced from over 964 million acres in 1987 to slightly less than 932 million acres in 1997; a decrease of approximately 3.4 percent.

Although the numbers of farms and the total land in farms have decreased during the decade from 1987 to 1997, the average farm size has increased from 462 acres in 1987 to 487 acres in 1997, approximately 5 percent. According to Gale (2000a) this increase is due in part to the need for farm operators who earn their primary living from farming to seek to expand their farms in order to cover fixed costs and still earn significant income. Gale also notes a rise in the number of small farms whose operators earn a substantial portion of their income from non-farm activity. By contrast, the number of new farm start-ups by younger entrants to farming is showing a steady decline.

Where agriculture was once the dominant defining rural characteristic, contemporary rural communities, while still strongly influenced by their predominate economic activity, display socioeconomic patterns that are no longer dominated by a single industrial mode, residential configuration, or lifestyle. Manufacturing and service industries are now a more important part of the rural economy, and rural communities have become more popular as tourist and recreational centers and as residential areas for retirees and families (ERS, 1995). However, not all agricultural production is rural based. At a time when the overall number of farms continues to decline, the interconnectedness of agricultural systems with urban infrastructure, such as transportation systems (highways, airlines), computer technology, social networks, currency exchange and investments has caused urban farming to increase. In 1997, 33 percent of all farms were located in counties that contained at least one metropolitan area (Heimlich and Anderson, 2001). These farms accounted for 39 percent of all farm assets and 18 percent of acreage in operation. Of U.S. counties that contained at least one metropolitan area in 1997, 802 also contained farmland. The average number of farms per county was 772 (CAST, 2002). For non-metropolitan counties that were adjacent to a metropolitan area, the average number of farms per county was 659 (CAST, 2002).

Urban farm operations are often characterized by greater variations in structure and practice than their more traditional rural counterparts. Urban farming involves diverse operations such as horticulture, aquaculture, arboricultural, poultry and animal husbandry, and includes niche farms, hobby farms, hunting preserves, dude ranches, 'you-pick' operations, direct top consumer sales and more (Brown, 2002; USDA, 2001). Farms located in urban counties are also more likely to be small farms, meaning those of size less than 10 acres (Brown, 2002).

An urban influence can have multiple effects on farming, but the primary effect is to increase the market value of farmland for development above its value when used for agricultural production (Barnard, 2000). Potentially, as much as 17 percent of the nation's farmland may be considered "urban-influenced" (Barnard, 2000).

Demographic Summary of Rural Communities

In 2000, the total population of the U.S. was 281,421,906, an increase of 13.1 percent over the previous decade (Census, 2002). During this same period, the population of non-metropolitan or rural America grew by 10.3 percent or 5.3 million people (Cromartie, 2002). The nation's population was 75.1 percent white in 2000, with a median age of 35.3 years. The average household size was 2.59 persons. Persons living at or below poverty accounted for 13.3 percent of the population. Median household income for 1997 was $37,005. Using 1997 as the base year (the last year for which Agricultural Census data are available) a State level summary of population and farming operations is presented in Table 2.3-2 below.

Table 2.3-2 State Level Summary of Population and Farming								
State	Total Population (1997 est.)	Percent Minority (1997 est.)	Percent Poverty (1997 est.)	Median Household Income (1997 est.)	Avg. Farm Household Income (1)	Agriculture Dependent Counties (2)	Land in Farms 1997.	Total Farms 1997
AL	4,319,154	26.8	16.2	$30,790	$54,895	2	8,704,385	41,384
AZ	4,554,966	11.1	15.5	$34,751	$73,140	1	26,866,722	6,135
AK	2,522,810	17.3	17.5	$27,875	$54,895	26	14,364,955	45,142
CA	32,268,301	20.0	16.0	$39,595	$73,140	6	27,698,779	74,126
CO	3,892,644	7.5	10.2	$40,853	$51,271	17	32,634,221	28,268
CT	3,269,858	11.6	8.9	$46,648	$49,372	0	359,313	3,687
DE	731,581	21.0	10.0	$41,315	$47,266	0	579,545	2,460
FL	14,653,945	17.1	14.4	$32,877	$47,266	5	10,454,217	34,799
GA	7,486,242	30.2	14.7	$36,372	$47,266	17	10,671,246	40,334
ID	1,210,232	2.9	13.0	$33,612	$54,489	18	11,830,167	22,314
IL	11,895,849	18.6	11.3	$41,179	$55,189	7	27,204,780	73,051
IN	5,864,108	9.3	9.9	$37,909	$55,189	3	15,111,022	57,916
IA	2,852,423	3.4	9.9	$35,427	$51,271	41	31,166,699	90,792
KS	2,594,840	8.4	10.9	$36,488	$55,189	44	46,089,268	61,593
KY	3,908,124	8.0	16.0	$31,730	$43,475	9	13,334,234	82,273
LA	4,351,769	33.7	18.4	$30,466	$54,895	8	7,876,528	23,823
ME	1,242,051	1.6	10.7	$33,140	$49,372	0	1,211,648	5,810
MD	5,094,289	31.1	9.5	$45,289	$47,266	0	2,154,875	12,084
MA	6,117,520	9.7	10.7	$43,015	$49,372	0	518,299	5,574
MI	9,773,892	16.4	11.5	$38,883	$49,372	2	9,872,812	46,027
MN	4,685,549	6.4	8.9	$41,591	$55,189	29	25,994,621	73,367
MS	2,730,501	37.3	18.1	$28,527	$54,895	11	10,124,822	31,318
MO	5,402,058	12.6	12.2	$34,502	$55,189	13	28,826,188	98,860
MT	878,810	7.1	15.5	$29,672	$51,271	21	58,607,778	24,279
NE	1,656,870	6.0	9.6	$35,337	$39,702	70	45,525,414	51,454
NV	1,676,809	13.4	10.7	$39,280	$51,271	0	6,409,288	2,829
NH	1,172,709	2.0	7.5	$42,023	$49,372	0	415,031	2,937
NJ	8,052,849	19.7	9.3	$47,903	$49,372	0	832,600	9,101
NM	1,729,751	13.0	19.3	$30,836	$54,489	7	45,787,108	14,094
NY	18,137,226	23.1	15.6	$36,369	$49,372	0	7,254,470	31,757
NC	7,425,183	24.6	12.6	$35,320	$47,266	6	9,122,379	49,406
ND	640,883	6.9	12.5	$31,764	$39,702	28	39,359,346	30,504
OH	11,186,331	12.6	11.0	$36,029	$55,189	0	14,103,085	68,591
OK	3,317,091	16.8	16.3	$30,002	$54,489	19	33,218,677	74,214
OR	3,243,487	6.2	11.6	$37,284	$73,140	8	17,449,293	34,030
PA	12,019,661	11.3	10.9	$37,267	$49,372	0	7,167,906	45,457
RI	987,429	7.3	11.2	$36,699	$49,372	0	55,256	735
SC	3,760,181	31.2	14.9	$33,325	$47,266	1	4,593,452	20,189
SD	737,973	9.0	14.0	$31,354	$39,702	49	44,354,880	31,284
TN	5,368,198	17.6	13.6	$32,047	$43,475	1	11,122,363	76,818
TX	19,439,337	15.3	16.7	$34,478	$54,489	65	131,308,286	194,301
UT	2,059,148	4.6	10.0	$38,884	$51,271	3	12,024,661	14,181
VT	588,978	1.8	9.7	$35,210	$49,372	0	1,262,155	5,828
VA	6,733,996	23.4	11.6	$40,209	$47,266	2	8,228,226	41,095
WA	5,610,362	10.6	10.2	$41,715	$73,140	11	15,179,710	29,011
WV	1,815,787	3.2	16.8	$27,432	$43,475	0	3,455,532	17,772
WI	5,169,677	7.8	9.2	$39,800	$49,372	6	14,900,205	65,602
WY	479,743	3.8	12.0	$33,197	$51,271	0	34,088,692	9,232
USA	**259,195,652**	**24.9**	**13.3**	**$37,005**	**$49,846**	**556**	**929,475,139**	**1,905,838**

Sources: U.S. Census of Population, USA Counties; 1997 Census of Agriculture; USDA various.

Notes:

(1) Estimated from regional data provided in Gunderson (2000).

(2) Based on USDA ERS County Typology (Ref)

2.3.1.3. Environmental Justice Populations

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", requires that Federal Agencies consider as a part of their action, any disproportionately high and adverse human health or environmental effects to minority and low income populations. Agencies are required to ensure that these potential effects are identified and addressed.

The Environmental Protection Agency defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." In this context, fair treatment means that no group of people should bear a disproportionate share of negative environmental consequences resulting from the action.

Consideration of the potential consequences of the proposed action for environmental justice requires three main components:

- A demographic assessment of the affected community to identify the presence of minority or low income populations that may be potentially affected;
- An integrated assessment of all potential impacts identified to determine if any result in a disproportionately high and adverse impact to these groups; and
- Involvement of the affected communities in the decision-making process and the formation of any mitigation strategies.

The USDA's strategy for implementing E.O. 12898 is to incorporate environmental justice considerations into USDA's programs and activities and to address environmental justice across its mission areas. Actions meant to identify and prevent to the greatest extent practicable, disproportionately high and adverse human health or environmental effects of USDA programs and activities on minority and low-income populations are also incorporated within this strategy (USDA REGS).

<u>Minority Populations</u>

In 1997, there were 29,397 full time minority farm owners in the U.S. This represents an increase of 3.4 percent over the previous decade. An additional 11,472 minority individuals were part owners in 1997. Minority tenant farmers included approximately 6,789 individuals. Combined, minority owners, part owners and tenants farmed a total of 58,738,577 acres. Of this acreage, tenant farmers represented the smallest acreage total, 2,192,725 acres. The distribution of minority farms in the U.S. is illustrated in Figure 2.3-4 below.

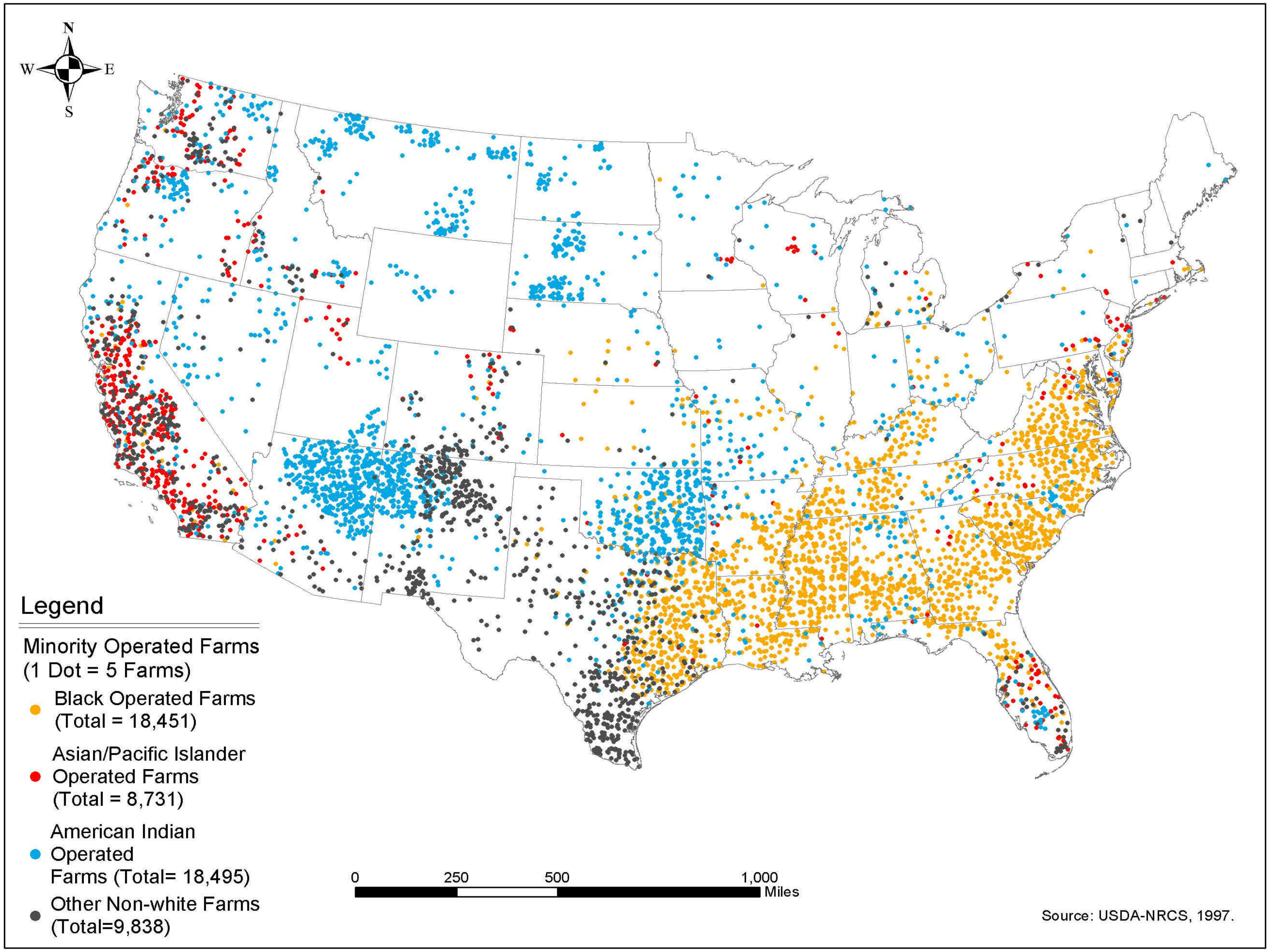


Figure 2.3-4 Distribution of Minority Farms in the U.S., 1997

Limited Resource Farmers

Limited resource farms include any farm with less than 25 cropland acres aggregated from all crops and the majority of the producer's annual gross income is derived from those acres, or where the annual cumulative household gross income is $20,000 or less. In 1998, limited resource farms accounted for 7.3 percent of all farms and 0.8 percent of total farm production. Collectively they controlled approximately 1.1 percent of total farm assets and 1.2 percent of all farmland owned (Hoppe, 2001). Table 2.3-2 provides summary data for limited resource farms in the U.S.

2.3.2 ECP and the Rural Economy

ECP is a land rehabilitation program. In an agricultural economy, land is one of the major production inputs. The quality of land as an input is a function of soil characteristics and weather conditions. Thus, not all land is of similar quality with differences in topsoil depth, composition, land capability class, erodibility, and yield. Other production inputs include labor, machinery, agricultural chemicals and petroleum products.

There is a certain level of substitutability between inputs. For instance, if one of the tractors breaks down, labor can be used as a substitute. Assuming that a landowner is farming to maximize profits using his or her most productive land, there is no substitute for land of similar quality. However, in the event the of a natural disaster, if the quality of land was degraded beyond the point where production was economically feasible, then outside inputs are needed to return the land back to where production is profitable. ECP provides those outside inputs to supplement the other production inputs. The inputs that ECP provides are discussed in detail in Chapter 3. Absent technological improvements, other inputs may be substituted on the existing land, but this may result in decreasing marginal returns.

Employment Trends in the Agricultural Economy

Farm employment figures reflect the number of paid agricultural production workers on farms, including paid family members. Agricultural services, forestry and fishing and other employment figures are the number of persons employed in these industries, and can include the number of persons working on the farm as well as off-farm workers involved in providing services to farm operators (NAICS, 1997; Albetski, 2002). Farm employment in the US increased 46 percent from 1980 to 2000, from 46,902,000 to 68,574,000, while non-farm employment grew at a similar rate, 47 percent. Agricultural services employment increased 138 percent during the same period, from 891,000 to 2,123,000. This latter figure is more reflective of natural resource based employment (excluding mining) since the category reported by the BEA is based on the U.S. Economic Census definition, which includes fishing and forestry employment in the statistic (see Table 2.3-3).

These are national figures, however, and may hide regional trends that may be positive. On-farm employment decreased in five regions of the country and increased in another five. The Appalachian, Delta, Mountain and Northern Plains states had declines of 26 to 32 percent, while the Southeast experienced a more moderate 3 percent drop. Non-farm employment experienced similar drops in the Appalachian, Delta and Northern Plains regions, indicating that the decline in employment was an overall economic trend, not one specific to the agricultural sector. The decline of farm employment in the Mountain states was clearly offset by increases in off-farm employment. This occurred to a lesser extent in the Southeastern states. The Corn Belt and Southern Plains regions were the only ones where the growth in farm employment exceeded the growth in non-farm employment.

Of note is that the states with the largest decline in farm employment had the biggest increase in jobs in the agricultural services sector. A substitute for hired labor on-farm may be the contracting out of service work such as chemical applications, harvesters and processing to third party firms. Operators may also opt to hire outside firms to take advantage of technological advances in planting, harvesting and farm management that an individual farmer may not be able to afford on his or her own. A secondary reason for the increase in agricultural service sector jobs may be the increased number of persons employed in commercial hunting and fishing industries.

Table 2.3-3 Change in Farm and Non-Farm Employment, 1980-2000, By Region Change, 1980-2000

Region	Non-Farm Employment	Farm Employment	Ag. Services, Forestry, Fishing, & Other	Cropland Acres*
Appalachia	-23%	-26%	194%	-8%
Corn Belt	30%	57%	180%	-2%
Delta	-25%	-27%	151%	-12%
Lake	43%	36%	167%	-10%
Mountain	12%	-32%	204%	4%
Northeast	57%	36%	113%	-21%
Northern Plains	-27%	-29%	174%	1%
Pacific	77%	46%	101%	-4%
Southeast	4%	-3%	133%	-12%
Southern Plains	61%	93%	160%	3%
U.S.	47%	46%	138%	-3%

Change is from 1982 - 1997. Hence, any decline in cropland acres between 1980 and 1982, and 1998 and 2000 is not accounted for, potentially biasing the data.

Source: (BEA, various); (ERS, various)

<u>Cropland Acres</u>

Although farm employment fluctuated by region in the U.S., the trend in cropland acres was overwhelmingly downward (see Table 2.3-3). An interesting trend is that, regardless of whether or not farm employment was decreasing, cropland acres were decreasing. Any increases, in the Mountain, Northern Plains and Southern Plains states were modest at best. In fact, the correlation between farm employment and cropland acres appears to be weak. The Southern Plains had the largest increase in farm employment from 1980-2000, while cropland acreage increased at the second to highest rate. Farm employment in the Mountain States had the largest decrease in farm employment, while cropland acreage increased at the highest percentage rate.